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Number 3

Mariners Weather Log

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Mariners Weather Log

Editor: Elwyn E. Wilson

July-August-September 1984
Volume 28, Number 3
Washington, D.C.

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Front Cover: The 471-ft Maltese freighter ELDIA lies hard aground at Nauset Beach near Orleans Mass. on Cape Cod. She was blown aground during a storm on March 29. She was refloated on May 18. WIDE WORLD PHOTO

The Secretary of Commerce has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 1,1985.

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Mariners Weather Log

COMPARISONS BETWEEN SHIP AND BUOY CLIMATOLOGIES

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ABSTRACT

Data from two recent climatic publications are compared, one consisting of analyses of climatic data from ships, the other from NOAA data buoys. The conclusions are in accord with concentional wisdom. On the average, winds and pressures match fairly well; air and sea temperatures from ships are slightly higher, wave heights lower.

DISCUSSION

Long term monthly means and standard deviations were selected for eleven buoys from Climatic Summaries for NOAA Data Buoys (U.S. Department of Commerce, 1982). Locations of the buoys are shown in figures 1 and 2. Buoy data were mostly from the late 1970's to early 1980's. For the same locations,data were interpolated from the U.S. Marine Climatic Atlas of the World (U.S. Navy, 1981). The atlas ship data were based on all available reports from the mid 1800's thru the early 1970's, though most data were accumulated since 1950 (virtually all data for waves). The atlas contained no buoy data.

Originally the atlas maps were plotted for five-degree latitude-longitude quadrangles. However, the means were adjusted to fit one-degree or two-degree analyses where it was felt that the five-degree mesh was too coarse, particularly in coastal areas. This was not done for the atlas standard deviations, so the atlas contains both point (time) and space components of variability in its standard deviation charts.

The results of the means are shown in figure 3 and the standard deviations in figure 4. In all cases, the scatter of values and the magnitude of the standard deviations seem to preclude definitive judgements. Diferences between the data sets are the combined result of climatic shifts during the differing periods of record and differences in measuring systems. The locations of shipping lands relative to the assumed positions of the data summaries as plotted on the maps may also have caused some differences. Keep in mind, however, that our main objective was to compare available long term climatologies. Further study will be necessary to determine the exact causes of the differences.

Despite the caveats, some qualitative

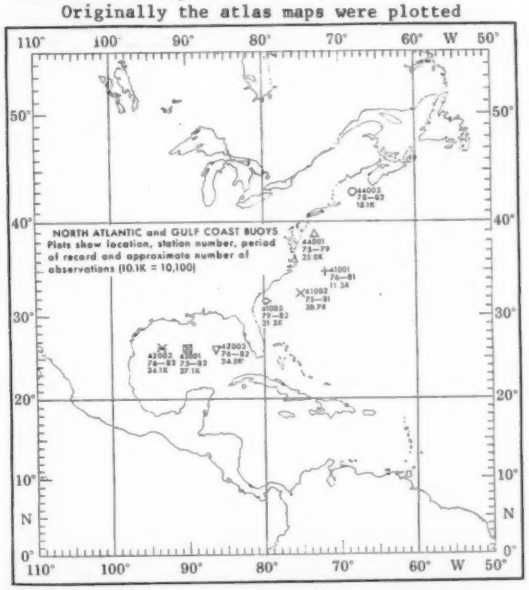

Figure 1.--North Atlantic and Gulf of Mexico buoys.

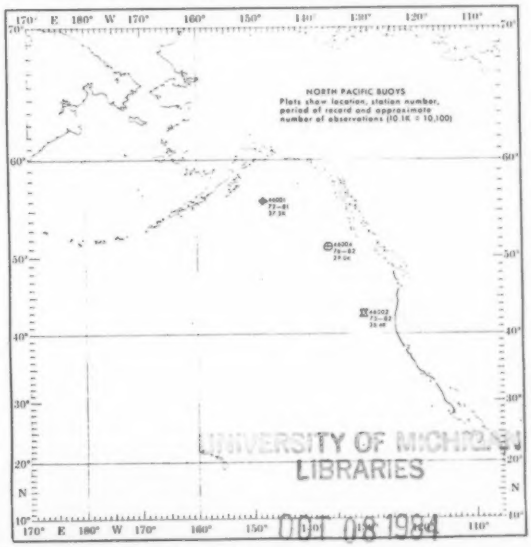

Figure 2.--North Pacific buoys.

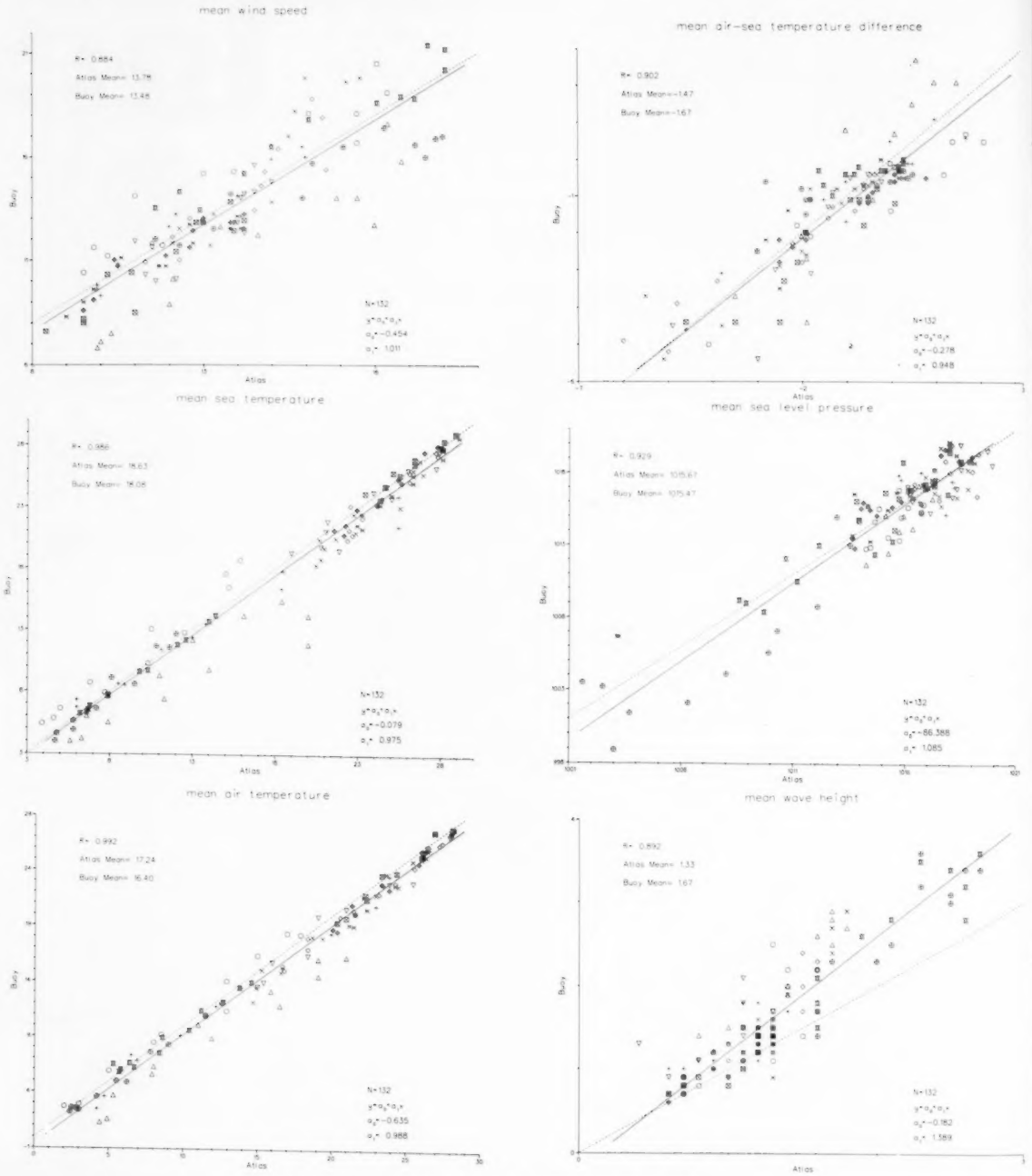

Figure 3.--Scatter plot of long term monthly means for buoys vs atlas ship data. Symbols denote locations plotted in figures 3 and 4. The dashed line is y = x. The solid line is the linear regression.

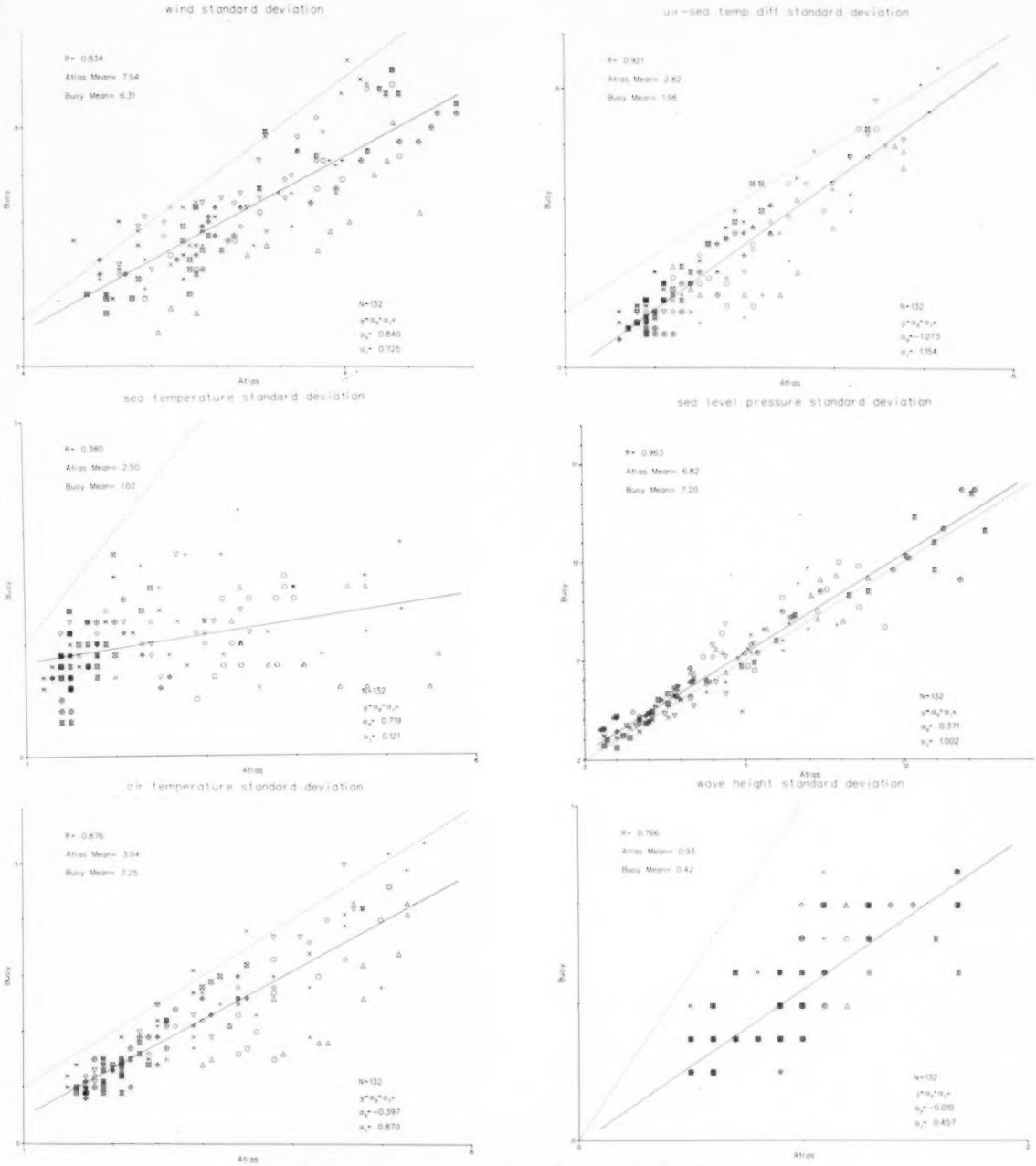

Figure 4.--Scatter plot of long term standard deviations for buoys (point data) and interpolated values from analyzed five-degree quadrangle atlas ship data. Symbols denote locations plotted in figures 3 and 4. The dashed line is y = x. The solid line is the linear regression.

statements can be made. The means generally show good coherence with correlations always above 0.9. High correlation coefficients are partly the result of the wide range over which the variables were measured. Nevertheless, they give some comparative measurement of the agreement between ship and buoy climatologies. Wind speeds agree fairly well, although the buoy anemometer heights are 5 to 10 meters, while ships average 20 to 25 meters, or report estimated winds. This has not been the case for Great Lakes buoys, which show lower wind speeds than the ships (Pore et al., 1981). The slightly warmer means from atlas ship sea-surface temperatures are probably partly due to the positive bias of intake measurements. The hull warming of the ship data appears evident in means of the air temperature, indicating possible radiation and ventilation problems. The air-sea temperature differences and the waves show the worst agreement, with some operationally significant differences in wave climatologies at the higher heights. This is partly because the atlas data used only the higher of sea and swell, while the buoy data included all waves. Pressures are very close on the average.

The standard deviations in figure 4 show that combining space and time variation in the atlas gives values that are generally too high for point source estimation. In actuality, the atlas does not claim to present point climatologies for the standard deviations. Rather, they were intended primarily to give an estimate of the variation over larger U.S. Navy operating areas, and to be used in quality control of ships, weather observations. Keeping in mind that five-degree quadrangles are equal in area only for the same latitude bands, one could use these graphs to estimate point standard deviations from atlas data for certain areas.

The degree to which the standard deviations differ is partly a function of the variability of the element in space and time. For pressure, where there is a good deal of time variation, as compared to space variation in the areas covered, the five-degree atlas ship standard deviations are fairly close to the body values. For sea-surface temperature, where the space variation is very important, the match is very poor.

ACKNOWLEDGEMENTS

Thanks to Sharon Fender and Wendy Landon for technical assistance. Joe Elms analyzed the atlas ship maps and Ron Baldwin performed the computer graphics. Tim Barnett made some helpful suggestions.

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Mariners Weather Log

GREAT LAKES NAVIGATION SEASON, 1983

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The 1983 navigation season opened on the St. Lawrence Seaway on March 31 when the 600-ft RIGHTEOUS transited the St. Lambert lock and the Canadian laker NANTICOKE entered the Iroquois lock. This was the beginning of the 25th year of service for the Seaway.

The Welland Canal opened on April 5, later than usual, due to construction at lock 7 and removal of a guard gate. The Norwegian tanker LAKE ANNE, (fig. 5) was first upbound and the CANADIAN PIONEER was first downbound.

The TARANTAU was the first vessel through the Soo on March 29, 3 days earlier than the scheduled opening.

Lakers had been operating since early March on some of the lakes, and a few may have operated on and off all winter.

25th Anniversary Logo

Figure 5.-- The LAKE ANNE, first vessel upbound in the Welland Canal on April 5, loaded tallow at Detroit on the 6th. She made five trips from Europe this year. Photo by Albert G. Ballert, Great Lakes Commission.

The last ship to clear the Seaway downbound without penalty was the STEELCLIFFE HALL. The A.S. GLOOSBRENNER, ALGOWEST, and JOHN A. FRANCE cleared later and had to each pay $60,000 late penalties. The RIA LUNA was the last saltie out of the system.

The WELLAND CANAL scheduled to close on December 31 had to close 4 days early due to ice and the severe weather. The RIA LUNA was the last overseas vessel through the canal. Twenty Canadian vessels wintered over in the canal. Early in January, 1984 the canal was dewatered from Lock 1 through Lock 7 (fig. 6). The ALGOBAY was the last ship through the Poe lock of the Soo on December 31.

Figure 6.--The Welland closed December 27, 1983, 4 days ahead of schedule due to adverse ice conditions and Locks 1 to 7 were dewatered for maintenance. Photo by Albert G. Ballert, Great Lakes Commission.

The NOAA weather buoys were deployed in April and recovered in November and December.

Figure 7 from the 1982 Annual Report of the St. Lawrence Seaway Development Corporation shows the history of the opening and closing dates of the Seaway.

Seaway Opening/Closing Navigation Dates, 1959-82

Year	Montreal-Lake Ontario Section			Welland Canal Section		
	Opened	Closed	Days of Navigation	Opened	Closed	Days of Navigation
1959	April 25	December 3	223	April 1	December 15	258
1960	April 18	December 3	230	April 1	December 16	259
1961	April 15	December 5	235	April 1	December 16	260
1962	April 15	December 7	244	April 1	December 16	260
1963	April 10	December 13	243	April 1	December 16	260
1964	April 8	December 7	243	March 30	December 15	251
1965	April 9	December 16	253	March 30	December 16	262
1966	April 1	December 16	259	April 4	December 16	257
1967	April 7	December 15	253	April 1	December 16	259
1968	April 8	December 14	253	April 1	December 22	266
1969	April 7	December 15	253	April 1	December 22	266
1970	April 4	December 17	258	April 1	December 30	274
1971	April 14	December 20	251	March 29	January 7	285
1972	April 12	December 23	256	March 29	December 15	262
1973	March 28	December 22	270	March 28	January 4	283
1974	March 28	December 17	267	March 29	January 17	296
1975	March 25	December 20	271	March 25	December 31	282
1976	April 9	December 24	259	April 1	January 3	276
1977	April 4	December 26	267	April 4	December 31	272
1978	April 3	December 27	264	March 28	December 31	279
1979	April 7	December 22	255	March 28	December 29	277
1980	March 24	December 19	271	March 24	December 31	283
1981	March 25	December 20	271	March 25	December 27	278
1982	April 5	December 21	261	April 5	December 23	263

NOTE: Actual dates reflect date of first/last commercial vessel entering or leaving the lock system.

Figure 7.--History of the opening and closing dates of the Seaway and Welland Canal. From the 1982 Annual Report, St. Lawrence Seaway Development Corporation.

Precipitation averaged 33.97 inches over the Great Lakes basin and was 6 percent over the long term average (table 1). Precipitation has been above average for 8 of the last 10 yr, 1974 and 1976 were below average. Lake Ontario basin was again this year the only lake below its 1900 to 83 average. Lake Erie received the most moisture and Lake Huron had the highest percentage above average at 14 percent.

Table 1.--Annual precipitation data (in)

Precip in inches	Gr. Lakes Basin	Lake Superior	Lake Michigan	Lake Huron	Lake Erie	Lake Ontario
1900-83 Avg.	31.84	29.90	31.41	31.64	34.24	34.61
1983	33.97	32.27	31.55	36.93	38.26	31.46

NATIONAL WEATHER SERVICE

The National Weather Service conducted the Marine Weather Program basically as in other years. The products and services included weather warnings, forecasts, advisories, and statements; ice forecasts and outlooks; low water statements, and lake shore warnings and statements. The number of gale and storm warnings were down slightly from last year (table 2). During the last 10 years only 1980 and 1981 had fewer warnings. Lakes Superior, Michigan and St. Clair were down from last year. Lakes Huron and Erie were up slightly with a vast increase for Ontario.

Table 2.--1983 Great Lakes gale and storm warnings

Month	Superior G	Superior S	Michigan G	Michigan S	Huron G	Huron S	St. Clair G	St. Clair S	Erie G	Erie S	Ontario G	Ontario S
January	6	0	6	0	1	0	0	0	3	0	-	-
February	2	0	1	0	1	0	0	0	1	0	-	-
March	4	0	4	1	3	1	2	0	2	0	-	-
April	5	1	4	0	3	0	2	0	4	0	-	-
May	2	0	2	0	2	0	0	0	3	0	6	0
June	0	0	0	0	0	0	0	0	0	0	0	0
July	0	0	0	0	0	0	0	0	0	0	0	0
August	0	0	0	0	0	0	0	0	0	0	0	0
September	1	0	0	0	1	0	0	0	1	0	3	1
October	3	0	2	0	2	0	0	0	3	0	8	3
November	9	2	8	1	7	1	1	0	8	0	7	0
December	5	1	4	1	5	1	0	0	6	0	4	1
Totals	37	4	31	3	27	3	5	0	31	0	28	5

Total Gale and Storm warnings issued past 10 years.

1983 - 177
1982 - 194
1981 - 136
1980 - 173
1979 - 227
1978 - 241
1977 - 262
1976 - 399
1975 - 276
1974 - 301

OBSERVATION PROGRAM

The National Climatic Data Center received 6,947 observations from the 38 lakers that participated in the program. These were only the synoptic observations submitted to the

National Climatic Data Center (NCDC) on the Great Lakes Ship's Weather Observations, NOAA Form 72-1A(GL) (table 3). This was more than double last year observations but much fewer than years prior to that. As usual Lake Superior had the most traffic and observations. Many other lakers radioed in weather observations but were not anemometer equipped so did not submit form 72-1A(GL).

Table 3.--Total count of ship observations, 1983

LAKE	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTALS
ONTARIO			2	1						1			4
ERIE				37	83	80	40	46	51	58	82	45	462
HURON				99	375	94	240	221	199	264	268	170	1887
MICHIGAN		4	6	74	317	124	163	219	211	332	358	225	1991
SUPERIOR			3	119	531	135	231	287	299	304	373	191	2603
TOTALS		4	11	330	1302	373	794	773	759	980	1073	539	6947

TOTAL NUMBER OF SHIPS REPORTING - 36

Table 4.--Summary of selected sever weather data

	WINDS	VISIBILITY	SEVERE WX	SEA HEIGHTS
SELECTION CRITERIA*	>30 KNTS	CODE < 96	CODES13,17-19,24, 27,29,a37 OR > 85	CODE>=12 (12 TO 20 FT) / CODE >12 (>20 FT)
TOTAL # OF OBS	726	447	80	23 / 9

Table 5.--High wind speed distribution (kn)

LAKE	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTALS
ONTARIO													
34-40													
41-47													
48-55													
56-63													
ERIE													
34-40					1				1	3	5	5	15
41-47				1	1						1	1	4
48-55													
56-63													
HURON													
34-40				2	4			2	1	6	25	7	47
41-47					1						1	4	6
48-55											1		1
56-63													
MICHIGAN													
34-40							1	1	2	11	25	33	60
41-47										1	5	4	11
48-55										1			1
56-63												1	1
SUPERIOR													
34-40				1	4	1		4	4	6	21	11	53
41-47										1	9	4	14
48-55										1			1
56-63													
TOTALS													
34-40				3	9	1	1	6	8	26	79	56	177
41-47				1	2					2	17	13	35
48-55										2	1		3
56-63												1	1

Table 6.-- Waves 20 ft or more

Lake	Ship	Date	Height (ft)
Huron	PAUL H. TOWNSEND	May 28	20
Michigan	J.A.W. IGLEHART	Dec. 6	20
Superior	ELTON HOYT II	Dec. 15	20

Table 4 shows a breakdown of the numbers of observations for selected severe weather types. Low visibility lead the group with winds greater than 30 knots next. Tables 5, 6, and 7 show the data on high winds and seas. May had the highest number of observations and the highest number of visibility reports of less than 2 miles. December had the highest percentage of low visibility observations. Since the number of observations in December were only about 40 percent of the number in May, December overall must have had worse visibilities than May.

The highest waves were 20 ft on Lakes Huron, Michigan, and Superior. Several supposedly observations of up to 66 ft were not considered because the wind speeds and periods were way out of tolerance. The highest wind was 56 knots on Lake Michigan in December.

This article and the tables include only those weather observations logged on the Ship's Weather Observation Form 72-1A(GL) and forwarded to the National Climatic Data Center.

Table 7.--Highest 1-min wind (kn) reported on the Great Lakes by U.S. Anemometer-equipped vessels

Year	Lake Erie		Lake Huron		Lake Michigan		Lake Superior		Lake Ontario	
1941	W	42	WSW	50	NW	43	NNW	54	--	--
1942	WSW	52	WSW	56	WNW	48	S	62	--	--
1943	WSW	57	WNW	42	SSW	50	WSW	52	--	--
1944	NE	38	NW	37	WSW	48	NNE	52	--	--
1945	WNW	52	SSW	54	WNW	49	NW	52	--	--
1946	SW	50	W	46	S	44	NW	47	--	--
1947	NW	51	SSE	43	ENE	39	WSW	43	--	--
1948	WSW	40	NNW	51	NW	45	WSW	48	--	--
1949	W	52	NNE	50	NNW	63	N	52	--	--
1950	SW	70	NW	48	NW	49	NW	83[1]	--	--
1951	W	37	WSW	50	SW	49	WSW	54	--	--
1952	SW	48	SW	37	SSW	44	WNW	48	--	--
1953	WSW	49	NW	45	NNW	48	ENE	50	--	--
1954	W	45	NW	45	E	48	N	63	--	--
1955	W	52	SW	57	WSW	50[1]	NW	49	--	--
1956	WSW	48	W	43	SSW	48	N	50	--	--
1957	WSW	73	SW	54	WSW	49	W	47	--	--
1958	SW	61	SW	43	SW	53	SSW	54	--	--
1959	W	42	NE	50	E	48	W	54	--	--
1960	NE	55	WSW	48	NW	55	N	54	--	--
1961	W	50	NW	47	NW	48	N	57	--	--
1962	NW	52	WNW	63	NW	48	NNW	69	--	--
1963	NNW	74	NW	60	N	52	NNW	52	E	35
1964	WSW	64	W	72	NW	54	WSW	62	WNW	50[1]
1965	WSW	60	WNW	98[1]	ESE	52	SW	70	W	46
1966	ENE	49	NE	60	NW	57	2 NNE	61	W	39
1967	WSW	43	W	50	ENE	56	N	83	W	32
1968	W	63	NNW	44	WNW	46	NNE	55	SW	31
1969	WSW	44	NNW	46	NW	50	SSW	50	--	--
1970	W	52	W	62	NW	52	W	63	--	--
1971	SW	50	N	53	N	50	SW	58	--	--
1972	W	46	NW	60	N	54	NNE	60	--	--
1973	SW	45	ENE	44	NE	56	NE	56	--	--
1974	ENE	48	SW	47	SW	43	ESE	46	W	30
1975	NE	49	WSW	60	SW	54	W	50	NW	32
1976	W	48	S	56	NNW	55	NE	54	W	34
1977	WSW	44	SE	48	ESE	44	SW	56	NW	36
1978	SSW	80[1]	ENE	50	E	56	S	58	WNW	32
1979	W	42	W	44	WNW	50	NNE	52	W	26
1980	NNE	44	N	50	NNE	50	S	56	--	--
1981	W	56	NW	50	NW	50	ENE	50	SSE	37
1982	W	43	W	53	SW	42	N	60	--	--
1983	SW	45	NE	49	W	56	NW	48	--	--
1984										
1985										

[1]Highest for each lake

NOTABLE WEATHER HAPPENINGS

It appears that Lake Michigan was the stormiest lake over all, and November was the stormiest month. December had the highest wind and most high waves. July had the most reports of severe weather with August a close second. Lake Huron had the most observations in this category.

This data and the number of observations must be evaluated in terms of the season and number of boats operating. Some of the most severe storms are likely to occur during the late fall and winter months when very few boats are operating.

The following paragraphs describe some of the more significant weather as indicated by the observations. Canadian ships and ships that do not forward their observations to the National Climatic Data Center may have experienced heavier weather and other storms as severe and not described. Tracks of the more severe storms are shown in figure 8.

JANUARY-FEBRUARY-MARCH

Most lakers are in layup this time of year but Coast Guard cutters and icebreakers and a few boats, barges and tugs still operate. There were two reports during February from the cutter ACACIA that made the printouts for the various meteorological criteria that I received from the NCDC to prepare this article. I do not get all the observations, only those that meet a certain criteria. I did not receive any high wind or wave reports for this 3 month period. A casual glance over the weather maps indicated there were several storms. and probably more than indicated here.

On January 6 and 7 a 996-mb storm center traveled from west to east across the middle

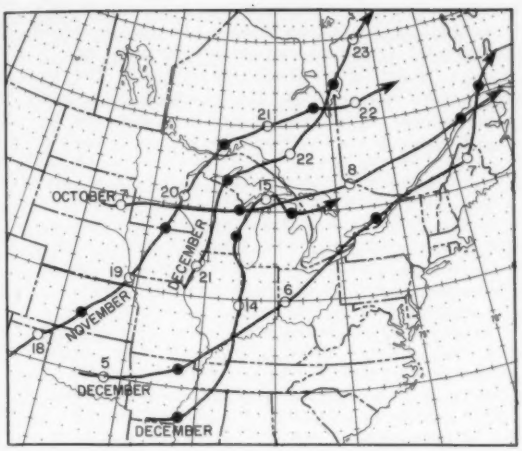


Figure 8.--Storm tracks with winds over 50kn and waves over 15 ft.

of the lakes. Heavy snow fell and there were indications of high winds. The 14th and 15th found a 1004-mb LOW moving west to east across the southern part of the lakes with heavy snow. A thunderstorm was reported at Buffalo, NY at 1200 on the 15th. Cold air followed closely behind this storm as north winds blew out of Canada.

The monthly mean air temperatures were 4° to 9°F above normal for the month of February over the Great Lakes, with 4°F near the eastern tip of Lake Ontario and 9°F over Duluth. A 986-mb LOW moved northeastward from Texas and was over the area on the 2d and 3d. Rain fell over the eastern lakes and snow moved eastward from the western lakes. Again a cold snap followed closely behind the storm.

On February 15 at 1800 the ACACIA reported thunder east of Milwaukee. The air temperature was 2°C with easterly 17-kn winds. At 0600 on the 22d her visibility was 1 mi in a snow shower with 15-kn northerly winds near the same location. The air was 5°C.

The monthly mean temperature for March was 3°to 5°above normal. The anormally pattern was broken up into cells this month. On the 6th and 7th a 992-mb storm moved northward west of the lakes with mostly rain. A second LOW formed on the 7th and moved eastward. The following HIGH brought cold air from Canada.

On the 9th northerly winds and nearly a foot of snow plagued Upper Michigan. Winds up to 40 mi/hr created 20-ft waves on Lake Superior. Visibilities were near zero in blowing snow.

During the period 18th to the 21st a LOW moved northward over the area from Florida. It brought rain and snow followed by cold air through the 25th.

APRIL

The first two weeks of April weak Spring storms regularly paraded across the Great Lakes. They produced a mixture of rain and snow with the snow mostly around Lake Superior and over Canada north of the lakes.

On the 13th a LOW moved out of Kansas and at 1200 was 995-mb over Iowa. The BENSON FORD was southbound on Lake Huron with 31-kn southeasterly winds. At 1200 on the 14th the 985-mb storm was centered over Wisconsin (fig. 9). Milwaukee measured 45 mi/hr winds with gusts to 51 mi/hr. The MYRON C. TAYLOR found 32-kn southeast winds on Lake Huron and the GEORGE A. STINSON had 36-kn north-northeasterly winds over central Lake Superior. By 1200 on the 15th the storm was over James Bay. The BENSON FORD still on Lake Huron had 32-kn southwesterly winds, the EDWIN H. GOTT had 13 ft waves on Lake Superior.

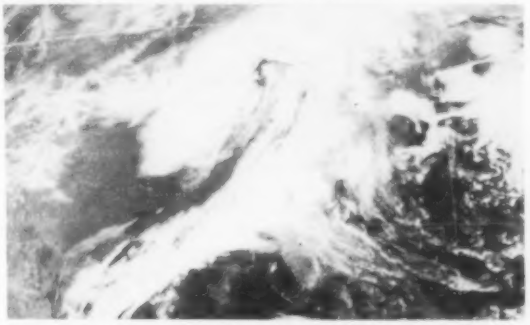


Figure 9.--The storm was over Lake Huron at 1700.

During the period of the 20th and 21st a LOW moved northward from New York City. The western edge of the storm caught Lake Huron. The BENSON FORD was now sailing northward and had northwesterly winds up to 37 kn with 7-ft seas.

There was some thunderstorm activity reported by boats on Lake Huron and Michigan during the month but the winds were light. On the 28th Cleveland had a thunderstorm and 39 mi/hr winds.

MAY

The lee slopes of the Rocky Mountains produced this storm on the first day of the month. At 1200 on the 2d it was a double centered 992-mb storm over Wisconsin and Michigan. At 1000 the PAUL H. TOWNSEND was in the Straits of Mackinac with 40-kn northeasterly winds and rain showers. At 1800 the PHILIP R. CLARKE on Lake Erie had 40-kn winds out of the southwest. The J.A.W. IGLEHART found thunderstorms over Lake Huron, and the JOHN G. MUNSON found them over Lake Michigan, as did the HERBERT C. JACKSON over Lake Superior. The storm quickly moved northeastward.

This storm also formed over eastern Colorado. Easterly flow was over the lakes on the 7th. At 1800 on the 6th the BENSON FORD on western Lake Superior had 34-kn northeast winds. On the 7th the J. L. MAUTHE found 38-kn winds on western Lake Superior and the GEORGE M. HUMPHREY over the central lake had 33-kn north winds. The bow of the MARJORIE LYKES was forced into a sea wall near Milwaukee in high winds and waves. Both the wall and ship were damaged. Forty miles per hour winds were recorded at

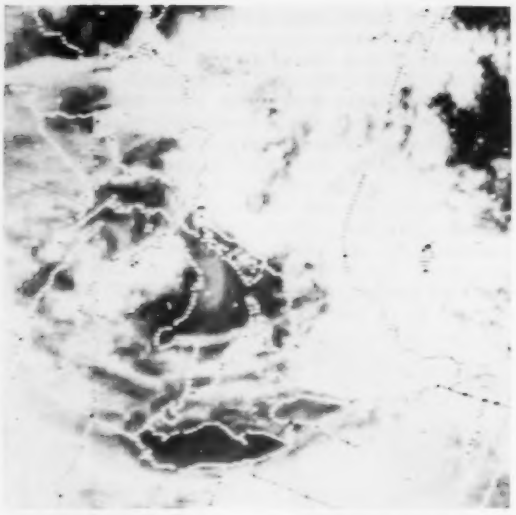


Figure 10.-- Fog in various degrees occured on all the Lakes on the 21st. NOAA Image

Green Bay. At 1200 on the 8th the 1002-mb storm was near Massena, N.Y. The GEORGE A. SLOAN had 32-kn north winds with 8-ft waves on Lake Michigan. The ELTON HOYT II had 32-kn north winds on Lake Superior.

The 20th to the 23d was a period of wide spread low visibilities across the lakes. These were associated with both rain and fog (fig. 10).

A weak front with waves moved over Lake Superior late on the 24th. It was near North Bay, Ontario at 1200 of the 25th at 1007-mb. The G.M. HUMPHREY had 31-kn north winds on Lake Superior. The LOW drifted eastward. The BENSON FORD on Lake Huron had 36-kn west winds on the 26th. The JOHN G. MUNSON also had 31-kn. The storm remained quasistationary and dissipated.

Cleveland had a record low temperature of 28°F on the 9th. Sault Ste. Marie had record low temperatures on the 16th, 17th, and 27th. The lowest was 24°F on the 16th.

JUNE

This was a quiet month. The LOWs and frontal systems were weak, seemingly more than usual. High pressure dominated the last half of the month. For some reasom the number of ship observations were down compared with May and July. There was only one observation of winds over 30 kn. That was 40 kn on the 21st over Lake Superior by the J.A.W. IGLEHART. There were only two observations of thunderstorms, one on the 5th by the JOHN G. MUNSON on Lake Huron, and the other on the 16th on Lake Superior by the EDWIN H. GOTT. There had to be many others but participating ships did not observe them.

Fog was the greatest danger this month especially on Lake Superior around the 4th and 22d.

Some record low temperatures were set on the 8th, 28th and 29th. In between those dates record high temperatures were set on the 21st, 22d, 23d and 26th.

JULY

July was a hot month across the lakes. Average temperature departures of 3° to 4°F were not unusual. Duluth's temperature tied with the 5th warmest July of 1892 and was the warmest since 1936. Record high temperatures both minimum and maximum were set at several locations, especially the middle of the month. Early in the month, 6th to 8th, record low temperatures were set at several locations.

There were quite a few thunderstorms reports with one of hail on the 5th by the WILLIAM R. ROESCH on Lake Superior. There were only three ship reports of winds higher than 30-kn and they occurred during the first week.

Only one significant LOW passed through the basin, from the 3d through the 5th. The storm was 988 mb at 1200 on the 4th. The GEORGE M. HUMPHREY on Lake Michigan had 35-kn south winds. At 0000 on the 6th she had 31-kn north winds east of Milwaukee. Buffalo, N.Y. had gusts to 43 mi/hr, and Cleveland had 36 mi/hr winds with gusts to 44, on the 4th, in thunderstorms.

During the period of the 17th through the 21st a weak front oscillated across the basin setting off thunderstorms. On the 17th Cleveland had gusts to 43 mi/hr and 39 mi/hr on the 21st. Duluth had 34 mi/hr winds.on the 17th. On the 19th Milwaukee had 37 mi/hr winds with 54 mi/hr gusts. Chicago had 44 mi/hr thunderstorm winds on the 19th. On the 20th winds were near 70 mi/hr near Erie, PA and on the 21st thunderstorms near Green Bay produced gusts to 121 mi/hr. Storms toppled trees and power lines across large areas of Michigan, Ohio, and New York. On the 29th a squall line produced heavy thunderstorms along Lake Erie. Four inches of rain fell at Dunkirk, NY.

The only lake with major visibility problems was Lake Superior with fog.

AUGUST

Most cyclones of significance tracked well north of the Lakes, except one on the 11th. There were weak LOWs, frontal waves, and fronts through the area that brought mostly welcome rains. The storm on the 11th came out of the High Plains and was 1002-mb over Michigan at 1200. It moved rapidly eastward and was over eastern Pennsylvania at 1200 on the 12th. There were five reports of winds over 30 kn by four ships on Lake Huron and Michigan between 0000 and 1200 on the 11th. The PHILIP R. CLARKE had 34-kn southeast winds on Lake Michigan and the MYRON C. TAYLOR had 34-kn east winds on Lake Huron where the HERBERT C. JACKSON had 40-kn east winds during a rain shower. The EDWIN H. GOTT had only 24-kn east winds on Lake Michigan during a heavy thunderstorm. On the 20th a cyclone moved north of the Lakes and a front across them. The J.L. MAUTHE on Lake Superior logged a 0400 observation of 38-kn west winds and 10-ft waves.

During August fog was not a major concern except for a few isolated cases.

SEPTEMBER

Frontal passages were the major weather maker this month. Cyclones still mainly moved

across central Canada at about 55°N latitude. On the 6th and 7th a front out of a LOW that crossed James Bay moved across the Lakes. The HERBERT C. JACKSON had 33-kn west winds at 1800 on the 6th south of Thunder Bay. At 0000 on the 7th, the GEORGE A. STINSON measured 40-kn winds in same area. Erie, PA had winds gusting to 78 mi/hr.

On the 16th and 17th a 1004 mb LOW moved across the Lakes. The JOHN G. MUNSON had 33-kn east winds on Lake Superior at 0000 of the 16th. The HERBERT C. JACKSON had 34-kn southeast winds on upper Lake Michigan at 1800. The J.L. MAUTHE found 36-kn south winds with rain on Lake Erie.

A trough moved across Lake Huron on the 22d and 23d producing thunderstorms. The PAUL H. TOWNSEND had showers of hail with 30-kn northwest winds. On the 25th a squall line was over Lake Michigan. The MESABI MINER had 25-kn winds with the squall and earlier had thunderstorms (fig. 11)

Between the 27th and the 30th fog was a problem on Lakes Huron, Michigan and Superior with visibilities as low as zero (fig. 12).

Figure 11.-- The MESABI MINER passing Detriot northbound. Photo by Albert G. Ballert, Great Lakes Commission

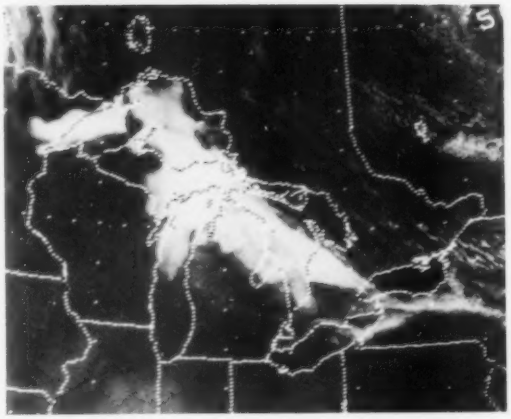


Figure 12.-- Fog covers portions of the three upper Lakes. NOAA Image

OCTOBER

This was a relatively mild month on the Lakes this year. There were only two cyclones of any significance. High pressure was a dominant feature. Several large HIGHs moved over the area and the mean sea-level pressure was 2 to 4 mb above normal. Visibilities were generally good. The last two days of the month fog was reported at many land stations but was not reflected on ships observations.

The first significant storm originated as a frontal wave on the 13th on a north-south oriented front that was drifting slowly eastward behind a large HIGH off New England. At 0000 on the 14th the storm center was 994 mb northeast of Saulte Ste. Marie. At this time the J.L. MAUTHE measured the first winds over 30 kn, of 32 kn, from the northwest on Lake Superior. At 0600 they were 40 kn with 12-ft waves. At 1200 there were reports of winds over 30 kn on all the Lakes except Ontario. The ERNEST R. BREECH measured 37-kn southwest winds on Lake Erie. At 1800 there were two reports of 44-kn winds (fig. 13). One was by the HERBERT C. JACKSON on Lake Michigan and the other by the H. LEE WHITE on Lake Superior. Both reported only 8-ft waves. Thunderstorms dropped small hail at the Buffalo Coast Guard Station where the wind gusted to 60 mi/hr. On the 15th the tight gradient and high winds were out of the area.

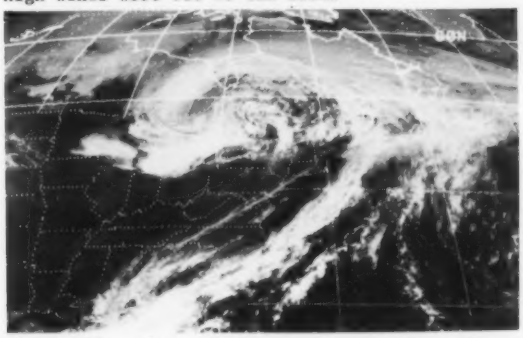


Figure 13.-- Some of the more severe storms have occured during October. NOAA Image

This storm formed over the east slope of the Rocky Mountains in Alberta on the 26th. It moved southeastward and the center passed over the southern tip of James Bay about 0600 on the 28th at 992 mb. At 1800 on the 27th the CASON J. CALLAWAY measured 40-kn southerly winds on Lake Michigan. At 0600 on the 28th the winds were still 40 kn from the southwest. At 0000 the MESABI MINER had 36-kn south winds on upper Lake Michigan with 15-ft waves. At 1800 on the 28th the storm was over Quebec Province at 990 mb. The BENSON FORD measured 48-kn northwest winds south of Isle Royale. At 0000 on the 29th the S.T. CRAPO near Green Bay measured 48-kn north winds. These two reports were the highest for this month. Winds, again gusted to 60 mi/hr at Buffalo, NY. The high winds moved out of the basin on the 29th.

NOVEMBER

The first third of the month the Great Lakes were mainly under high pressure. Some precipitation occurred but there were no significant storms. There were more wind reports over 30 kn this month than any other. The month also had the

second highest number of observations. Visibility was not a major problem.

This major storm started moving northeastward from Oklahoma on the 9th. East to northeasterly winds were already blowing over Lake Michigan, Two ships found winds slightly over 30 kn. At 1200 on the 10th the storm was 1008 mb over central Illinois. The SPARROWS POINT measured 43-kn northerly winds on Lake Michigan. The WALTER A. STERLING measured 35-kn north winds on Lake Superior. At 1200 on the 11th the 992-mb storm was centered over western Pennsylvania (fig. 14). At 0600 the GEORGE A. STINSON was on Lake Huron and measured 49-kn northeast winds and 12-ft waves, the highest winds of the month. The EDWIN H. GOTT had 15-ft waves on Lake Michigan. The SPARROWS POINT now had 38-kn northerly winds. The storm was centered over Maine on the 12th, but the H. LEE WHITE still found 33-kn winds on Lake Huron.

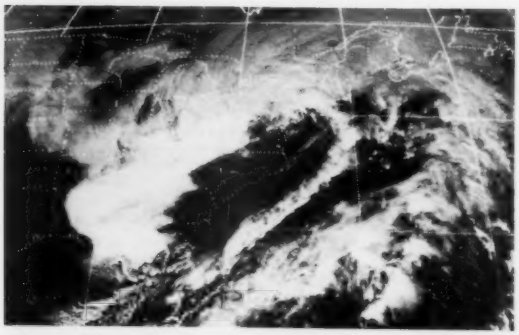


Figure 14.-- Another November 11 storm. The EDMUND Fitzgerald sank during a November 11 storm in 1975. NOAA Image

This storm came out of the Texas panhandle on the 14th. At 1200 on the 16th it was 996 mb near Buffalo. The S.T. CRAPO had 34-kn north winds on Lake Michigan. The GEORGE M. HUMPHREY found 43-kn northeast winds with 13-ft seas on Lake Superior. The WALTER A. STERLING had winds up to 34-kn on Lake Huron. Although the gradient was still tight over Lakes Huron and Erie on the 17th there were no wind reports over 30 kn.

This storm formed over southeast Colorado on the 18th. At 1200 on the 20th it was 982 mb south of Duluth. The EDWARD B. GREENE measured 40-kn southeast winds with 12-ft seas on Lake Huron. At 1200 on the 21st the 982-mb storm was near 50°N, 85°W. The GEORGE A. STINSON had 42-kn west winds on Lake Superior. Nearby the ELTON HOYT II had 45-kn west winds and 15-ft seas. The SPARROWS POINT had 36-kn winds on Lake Michigan, and the JOHN G. MUNSON measured 38-kn winds on Lake Huron. The storm was centered over James Bay on the 22d at 0000. At that time there was 40-kn winds on Lake Superior. By 1200 the storms' circulation was out of the area.

A frontal wave formed near Hannibal MO on the 23d and rapidly deepened as it moved northward. It was 977-mb over Lake Superior at 0000 on the 24th. At 1800 of the 23d the BENSON FORD had east winds of 47-kn and 13-ft seas on Lake Superior. At 0600 of the 24th the EDWARD B. GREEN had 46-kn from the south. on Lake Michigan the ELTON HOYT II had southwest 45-kn winds. The J.L. MAUTHE had 32-kn southwest winds on Lake Huron. By the morning of the 24th, 19.7 in. of snow had fallen at Duluth, 16.5 in. in 24 hrs. breaking the all time record for November. That night the wind reached 91 mi/hr at Grand Marias and 69 mi/hr at Whitefish Point. On the 25th the CALCITE 11 measured 34-kn winds from 250° on Lake Erie. The storm continued moving northward on the 25th.

As many storms do affect the Great Lakes, this one was due to cyclongenesis as air moved down the lee side of the Rocky Mountains. The cyclone formed on the 25th and moved southward to the Oklahoma panhandle. By the 27th it was movingg northeastward. The first strong wind report was at 1200 by the J.L. MAUTHE of 32-kn northeast winds with rain sailing northward from the Chicago area. At 1200 on the 28th 992 mb storm was centered over Iowa (fig. 15). There were more reports of winds over 30-kn than any other this year. There were 17 reports on the 28th. The highest wind was by the MESABI MINER on Lake Superior of 44-kn from the east at 1200 on the 28th. At 0000 on the 29th she had 15-ft waves, with 43-kn. The ERNEST R. BREECH had 37-kn on Lake Huron. On the 29th the EDWIN H. GOTT measured 36-kn southwest winds with 12-ft seas on Lake Erie. The storm moved over Lake Superior on the 29th and at 1200 on the 30th was near the tip of James Bay. There were still strong winds reported on all lakes except Ontario, but few reports are received from there from American vessels. The JOHN G. MUNSON reported 38-kn from Lake Erie. On December 1 the storm was over Labrador.

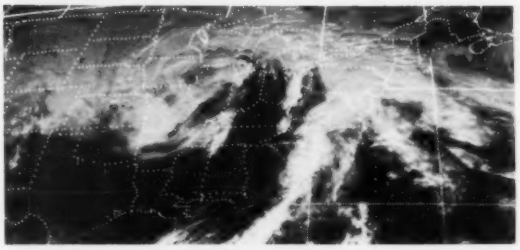


Figure 15.-- At 1700 the storm center was near Chicago. NOAA Image

DECEMBER

This was a very severe weather month on the Lakes, not only from cyclones but from extreme cold with anticyclones. There were several severe storms with the highest measured wind for the year of 56-kn occurring on the 22d on Lake Michigan. The highest waves of the year--20-ft--also occurred on both the 6th -- Lake Michigan, and the 15th -- Lake Superior. The last week of the month there were many record setting low temperatures and ice formed quickly. Several ships became stuck in the ice and the Welland Canal had to close 4 days early.

The first storm moved northeastward out of Oklahoma on the 5th. It quickly deepened and at 1200 on the 6th was 997-mb near Dayton, Ohio. There were several wind reports of 40-kn or greater. The MESABI MINER measured 42-kn north

winds and 15-ft waves on Lake Michigan. The winds were 43-kn on the 7th. The J.A.W. IGLEHARDT had 40-kn winds and 20-ft seas on Lake Michigan. The GEORGE M.HUMPHREY measured 45-kn north winds on the 7th on Lake Huron. At 1200 on the 7th the storm was 961-mb over Maine.

On the 11th and 12th a 1048-mb HIGH moved east-southeastward north of the lakes. A low was pushing northward from Arkansas into Illinois. The MESABI MINER had 42-kn east winds with 12-ft waves on Lake Huron on the 11th. Visibility was restricted by snow. The WILFRED SIKES had 36-kn on Lake Michigan. On the 12th as the HIGH slipped eastward and the LOW northward, the winds came under cyclonic circulation rather than anticylonic as on the 11th. The WALTER A. STERLING on Lake Erie had 36-kn southeast winds. The gradient associated with the LOW was not as tight as with the HIGH and and the winds decreased.

A LOW formed over the Mississippi Delta on the 13th and moved northward for better alignment with the upper-air center over Iowa. At 1200 on the 15th it was 996-mb near Green Bay. The ELTON HOYT II measured 46-kn northeast winds with 20-ft waves on Lake Superior. A few miles to the north and west the GEORGE M. HUMPHREY also measured the same identical wind but the waves were only 8-ft. On the 16th the JOHN G. MUNSON had 35-kn north winds on Lake Michigan. The LOW dissipated into a trough and moved eastward.

Using maximum winds as criteria this was the most severe storm of the month. There were quite a few observations considering many ships were already in layup. A strong HIGH that had moved southeastward out of the Canadian Rocky Mountains was east of the Great Lakes on the 21st, at 1049-mb. There was an inverted trough along the Mississippi Valley. A LOW formed and quickly moved to Duluth at 0000 on the 22nd. Gale-force winds were already blowing from the southeast on the 21st. The ELTON HOYT 11 was on Lake Huron with winds up to 38-kn and seas up to 15-ft. She developed fractures across the weather deck about amidships. On the 22d at 1800 the GEORGE A. SLOAN was northeast of Chicago and measured 56-kn west winds (fig. 16). The waves were only 10-ft but there was little fetch. Near the north end of Lake Michigan the MESABI MINER measured 44-kn. The visibility was only 200 meters in fog, less than the length of the ship. Six hours later at 0000 of the 23d the

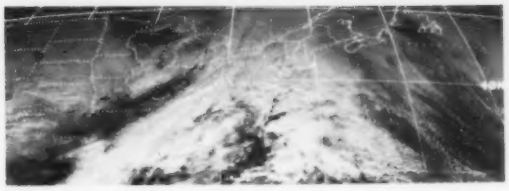


Figure 16.--The storm with the highest winds of the year. NOAA Image

wind was still 42-kn with 12-ft waves and the visibility was zero. She reported 4-cm of ice on the ship. The ELTON HOYT II was on Lake Huron with 36-kn south winds and 5-cm of ice.

By the morning of the 22nd Duluth had already measured nearly 6-ft of snow this season. The highest total in 114 yr of records.

The LOW moved or was shoved northeastward as a large extremely cold 1063-mb HIGH plunged southeastward from Canada. On Christmas Eve, the WALTER A. STERLING was on western Lake Erie with 45-kn west winds.

Northerly circulation from the 1063-mb cold HIGH mentioned above, covered the U.S. west of the Rocky Mountains as far south as the Gulf of Mexico on the 24th. It was centered over Montana. More than 125 low temperature records were broken Christmas day. Several ships became stuck in ice and had to be freed by icebreakers and tug boats (fig. 17). Among them were the JUPITER, JOSEPH L. BLOCK, AMERICAN REPUBLIC, ALGOWOOD, PHILIP R. CLARKE, AND J.W. MCGRIFFIN. The EDWIN H. GOTT went aground in the St. Marys River in brash ice. The E.B. BARBER and 14 other vessels were trapped in the icebound Detroit River. The EDWARD B. GREENE was trapped in the Pelee Passage for about 15-hrs. The cold wave continued into the New Year.

ACKNOWLEDGMENTS

Appreciation is extended to the masters and mates aboard the cooperating vessels for their valuable observations and contributions to the National Weather Service observing program. Useful information and photographs were contributed by Albert G. Ballert of the Great Lakes Commission. Of primary importance were the wind, wave. visibility, and severe weather observations prepared by Eddie Barker of the National Climatic Data Center, Asheville, NC, upon which much of the specific weather information is based.

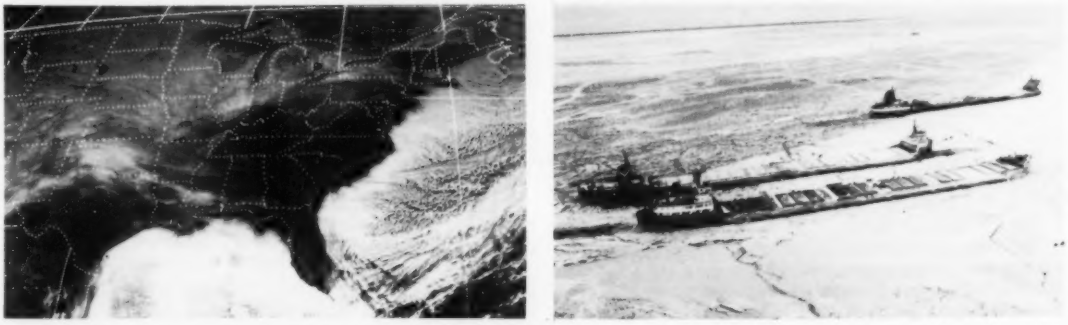


Figure 17.-- The extremely cold air produces low clouds as it moves over the warmer water(left). The RALPH MISENER, BEAVERCLIFFE HALL, and SILVER ISLE push through 5 to 7 inch ice near Detroit Harbor Light on the 26th. PHOTO courtsey of THE DETROIT NEWS

Marine Observations Program

Jerome W. Nickerson
National Weather Service/NOAA
8060 13th Street
Silver Spring, MD 20910

U.S. VOLUNTARY OBSERVING SHIPS (VOS)

The U.S. program is very international. There are ships with 53 flags in addition to the U.S. flag that make up the 1,300 or so U.S. VOS. There are also about 600 foreign supervised ships that report and record weather in U.S. forecast areas like program ships. Our program is open ended in that we do not restrict participation by size, flag or equipment. Our PMO's visit ships in other VOS programs as a courtesy. We encourage all ships to participate in some VOS program.

In addition to providing the materials and information needed for observations, we also are the liaison between the mariner and the National Weather Service (NWS) and the National Oceanic and Atmospheric Administration (NOAA). Mariners are encouraged to use the space on the back of the NOAA Form 72-1A, "Ship's Weather Observations", write a letter, or talk to any of the 17 Port Meteorological Officers to offer comments or suggestions, or make a complaint.

We even furnish pre-addressed postage-paid envelopes. Ships pay nothing to participate in our VOS progam. All the materials furnished the ships are free of charge as the materials are essential to making weather observations and weather reports. Any attempt to charge for these materials should be reported immediately to your servicing PMO or to me. For your convenience my full mailing address has been added to the heading.

VOLUNTARY OBSERVING SHIP (VOS) STATISTICS

It is always a pleasure to report substantial improvements in the VOS program, and there have been several favorable trends during the last year.

Ships Weather Reports to U.S. Radio Stations

MO/YR	May, June/83	May/84	June/84
Reports	21,000 (avg)	32,512	34,736
Monthly increase			6.8%
Annualized increase		55%	82%

The above data are for reports through U.S. radio stations and U.S. coastal earth stations (CES's) for INMARSAT.

Ship Weather Reports (Global)

MO/YR	May/84	June/84
		(K=rounded
Reports *	9.8k	104k thousands)
Monthly increase (percent)		6.1%
Annualized increase (percent)		73%

* This includes about 5,500 reports from 43 U.S. data buoys. Reports are received through the Global Telecommunications Systems, U.S. radio stations, and INMARSAT.

These statistics show that the extra efforts that each of you have been making are paying off--a job very well done. But, there is more!

*This includes about 5,500 reports from 43 U.S. data buoys. Reports are received through the Global Tellecommunications System, U.S. radio stations, and INMARSAT.

These statistics show that the extra efforts that each of you have been making are paying off--a job very well done. But, there is more!

More Observations On Time

I don't have numbers for the times when U.S. radio and INMARSAT reports arrive at NMC. As you must know, we are staffed to do almost everything with the computer, and that program isn't functioning. However, in glancing through the stack of 72-4A's that the radio officers send me, I see that almost all weather reports are now being sent from one half hour before to one half hour after the synoptic hours. There is also a small jump in the 3-hourly or intermediate synoptic reports. It looks really good, keep up the good work.

We do have data from the Global Telecommunications System which includes the U.S. radio stations and INMARSAT reports.

Receipt of Global Ship Reports (June 1984)

Hours after synoptic time	0-1	0-2	0-3	0-6
Percent of total	40	70	80-85	90-95

Considering that these are ship weather reports from over the entire globe, the record is quite good. With the communications systems being continually improved the arrival time of weather reports at the various meteorological centers is going to move closer to the synoptic hour.

Reports per Ship per Day

How many observations do the observers of your ship make each day at sea? How many are transmitted as weather reports? How many are transmitted on time?

Statistics indicate only 0.4 weather reports are transmitted from VOS ships per ship per day. This is not a really bad number considering all the factors such as in-port time, lay-up time on a few ships, ships that are still carried on our lists that are out of commission, ships outside the U.S. reporting area, and so on. The number has been slowly increasing lately, but not nearly fast enough. The records, "Ship's Weather Observations" show there are many more observations recorded than are being transmitted. There are good reasons for some ships not reporting, but many often misunderstand the value of the weather report. We still have some ship masters and mates that think "once-a-day" is enough, or "what do you need a fair weather report for, I always report in a gale or a storm?" These attitudes could be hazardous. Let me explain how this system can work for you.

When your observers (mates) make a weather

observation, and the radio officer transmits it on time, it is used by the forecaster and in all the computer models. There are dozens of computer programs or models that take all of the weather observations and use them in complex equations to produce maps, graphs and tables for the forecaster. Along with the surface and several upper level analyzed maps, the forecaster uses the computer products to make his decisions on the weather forecast. These products will only be as good as the data (weather reports) flowing into the computer.

The computer has one other important feature that you should know. It has very good table manners - it never chews wirh its mouth open. When it is time for the computer to work, it will accept no more weather reports. This is called the "cut-off time." If your weather report is to be used in any particular computer program it must be at the National Meteorological Center (NMC) before the cut-off time.

Most computer programs start out with a climatological background. The climatology comes from the "Ship's Weather observations," NOAA Form 72-1A, which are used by the observer to record the weather. This climatological background fills in the areas where there are no ship weather reports.

When a ship, yours for instance, gets a weather report to NMC in time, the computer accepts the actual ship weather report over the climatology for that position. This also changes every climatological data point in the vicinity, because the model must be consistent in space. This is an immediate action, but if no other reports are received in this area during the following synoptic hours, the computer model will gradually revert back to the climatological backgrund. This happens with the "once-a-day" ships.

If a ship reports consistently, in regular sequence, the effect on the computer model resembles a bow wave well ahead of the ship, with a wide, spreading and slowly dissipating wake behind. Clearly, it is to your advantage to create this condition and keep up the weather reports from one port to the next for the safety of your ship and cargo.

QUALITY CONTROL

Just as important to a forecaster as filling a weather map with observations is having confidence that the observations are accurate. Quality control is actually a misnomer for us. We have no control over the quality of the observations, but you do. Quality control starts on the bridge. Let me share with you some of the errors I see, after the fact of course, and offer some suggestions.

CALL SIGN (D. . .D-- with the increased use of SITOR, IMMARSAT and single sideband (SSB) voice radio weather reports the weather report is being read directly from the 72-1A more and more. Sometimes the radio call sign of the ship is left off. The computer searches back from the 99XXX group the proper number of charatters and prints the next group as the call sign. If nothing is there then the default word "SHIP" is supplied by the computer.

DATE TIME (YYGGi$_w$) -- Occasionally a ship that is not making regular observations will get the GMT date or time confused. This puts data on the wrong map which makes the observation elements in error. Both time and date are GMT (UTC).

SHIP's POSITION (99 $L_aL_aL_aQ_cL_oL_oL_oL_o$) -- "At interstate 95, hang a left!" We still see some ships going overland according to their reported position. Some errors are due to radio transmission and relay errors, but I have a 72-4A from last month made out by a mate which says he is in downtown Washington, D. C. Please double check your position. Some errors occur during the conversion of minutes and seconds (navigation) to tenths of a degree (weather report). There is a table on page 2-11 of the NWSOH No. 1 that should help.

WIND (Nddff) -- The most frequent wind error is direction reversal. Wind direction is the direction <u>from</u> which it is coming. Ships with anemometers may use the shaded "Apparent Wind" section to log the data they need to make a true wind calculation. Please give the anemometer height in the heading. It is important in computing the wind at the surface which is less than the wind at anemometer height.

Ships without anemometers do <u>not</u> fill out the shaded portion if they are using the roughness of the sea to estimate the wind. The direction and speed of the wind is entered directly in the Nddff group.

Wind direction and speed are supposed to be a 10-minute average, but few ship observers have time to view an anemometer this long. However, try to make several readings during the period of the weather oservation so that you can be sure the reported wind is neither the peak nor a lull. New true wind plotting boards are available through any PMO (see announcement).

DEW POINT TEMPERATURE (2$s_nT_dT_dT_d$) -- We'll also cover air temperature and wet bulb temperature in this section.

The wet-bulb thermometer reading is always equal to or less than the dry-bulb. If it is not there may be a separation in the mercury column of a thermometer, moisture on the dry-bulb thermometer, the wicking over the wet bulb may be soiled or contaminated with salt spray, or there may not be enough wind to properly ventilate the thermometers. Nine knots of relative wind is all the wind needed to properly ventilate the wet bulb. If the wind speed is lower, twirl the thermometer on the upwind side. You should note the changing of the wet bulb wicking in the remarks section of the 72-1A.

PRESSURE (4PPPP)--Atmospheric (barometric) pressure is used in most computer models and as the basis for surface weather map analysis. This observation is also very useful aboard ship as it is directly related to storms and wind.

PRESSURE TENDENCY (5appp)--Can be determined by recording (at least) position and pressure hourly (see NWSOH No. 1) or using a barograph. Rapid rise or fall of barometric pressure is

usually associated with proportional wind speed changes.

WEATHER ($7wwW_1W_2$)--Usually very good, except for nonsignificant weather reports (see NWSOH No. 1). If ww is 00, 01, 02, or 03, and W_1 and W_2 are both 0, 1, or 2 the weather group ($7ww_1W_2$) is omitted (left blank) and i_x in the group $i_r i_x hVV$ is reported as 2.

CLOUDS ($8N_hC_LC_MC_H$)--Somewhat complex because of the interrelation with N in the Nddff group. N_h is the amount of the low cloud C_L; if there is no C_L, then N_h is the amount of the middle cloud, C_M. N_h is not used with C_H, with or without C_L and/or C_M clouds. Using N_h and N as a pair, the forecaster can get a good picture of the clouds. 8000n, n being any appropriate number, means that there are no low or middle clouds and N (not N_h) will give the amount of high cloud C_H. 8n0n0 means that there are no low (C_L) or high (C_H) clouds and n (N_h) and N, should indicate the amount of middle clouds and be the same. 8nnn0 means there are both low and middle clouds, but no high clouds, so (N_h) is the amount of low clouds only. By subtracting N_h from N we can find the amount of middle louds. If the high cloud, C_H, was included, N would be the total cloud cover, N_h only the amount of low clouds (C_L) and the remainder of N would indicate the combined C_M and C_H. The cloud group $8N_h,C_LC_MC_H$ would be omitted if N were either 0 or 9, meaning the sky was clear or obscured. The / means that the clouds are not visible owing to darkeness, fog, blowing dust, sand or snow, or other similar phenomena. It implies that you cannot see above that level, i.e, 8nnn/ (OK), 8nn// (OK), 8n/nn (NO! - lower level obstruction to vision), 8//// (NO - use 0 or 9 for N and omit the 8 group, see NWSOH No. 1).

$222D_sv_s$--222 is needed to reset computer to accept remaining data in its proper location. D_sv_s, ship course and speed made good for the last 3 hours, is needed when the 5appp group is used. This also helps in warnings and ship routing.

SEA SURFACE TEMPERATURE ($0s_nT_wT_wT_w$)--This should be water temperature measured at the surface, or a calibrated induction intake temperature. These measurements are used in the computer models and as "ground truth" (actual measurements) for the satellites. The forecaster and ship officers also use seawater temperature for fog forecasting.

WAVES ($2P_wP_wH_wH_w$)--One of the most important forecast elements for ships; therefore, accuracy in the observation is most important. Calm sea (wind wave) is indicated by 20000.

SWELL ($3d_wl_wl_wd_w2_w$ $4P_w1P_w1H_w1H_w1$ $5P_w2P_w2H_w2H_w2$)--This is also a very important data set for the forecaster; however, there is an awful lot of "forcing" to fill these groups. Swell are significantly longer period compared to height than wind waves. The crests would normally be more even and horizontally longer than wind waves. Swell also are very consistent, i.e., they all have almost the same height and period over many waves, called a wave train. Although they can come from the same, or nearly the same direction as the sea waves, swell should be significantly different from the sea waves in other characteristics before calling them a separate swell wave train. The steep face is almost always recognized as a sea (wind) wave, but the flatter, smoother back of the same wave may be incorrectly called swell. You must look at waves from all angles. The normal sea waves in a seaway have many different shapes and sizes. Be sure it really is swell before you use the 3,4, and 5 groups. When there is definitely no swell, 30000 should be recorded and reported, but the 4 and 5 groups should be omitted.

ICING ($61s_sE_sE_sR_s$)--This group should be reported when icing occurs regardless of the amount. Large ships will often not notice the icing at the bow or below the gunwale or think it too insignificant to report, but this information could be crucial to the survival of a small fishing boat. Icing should be reported as a SPREP.

Something new - several ships are sending the same weather report twice about 10-30 minutes apart. This strange practice does nothing to guarantee reception. It does guarantee that both reports will be questioned and their value lessened. Something not new - following the call sign, the first 5 groups have no indicator number and must be reported. All other groups with the indicator numbers should be omitted if there is nothing significant to report, i.e., don"t transmit or record 7////, 8////. etc., just leave the groups blank.

SHIP'WEATHER OBSERVATION, NOAA Form 72-1A and "Weather Report for immediate Radio Transmission," NOAA Form 72-4A Update

These forms are being updated. If anyone wishes to comment on the present forms or suggest improvements for new forms before we go to press, please address them to me and include them in the next envelope to your servicing PMO.

Black Ink Ballpoint Pens

We have requested that the "Ship's Weather Observations Records," NOAA Form 72-1A be filled in with black ballpoint pens. This is because the forms are photo recorded. As this is a requirement to produce these forms in a photo-ready condition we are mailing you ballpoint pens with photo reproduction black ink to record your weather observations.

Computers, Satellites, Radar, and Ship Observations

About one a month I receive a letter from some mate or radio officer complaining that with the modern computers and satellites they should not be tasked with making "old-fashioned" weather observation from ships. How wrong he is!

Satellites, at present, "see" and measure the temperatures of the tops of the clouds in addition to a few other more sophisticated uses. Where there are no clouds they can measure the temperature of the surface within limits. Water vapor, smoke, haze and, of course, fog and clouds sometimes prevent accurate measurements of surface temperature. The satellite analysts will need the ship observations into the forseeable future for "ground truth" (actual surface) measurements to verify the accuracy of the satellite measurements.

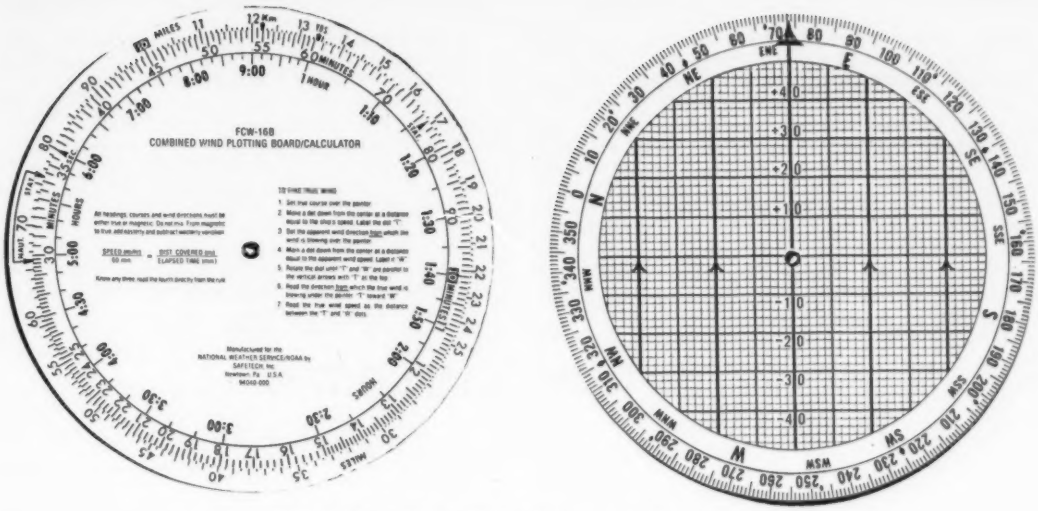


Figure 18.-- The actual size is 8 inches in diameter.

Computers are invaluable in all sorts of things including meteorology (weather) and oceanography. However, computers depend upon the input of data (weather reports) to produce products to help the forecaster.

Here is another way to look at it. The National Weather Service maintains weather observing stations over the lower 48 states of the U.S. at least every 125 miles apart in all directions. Around cities and along the coasts, they are much closer together. If satellites, radars and computers could do all weather observing along, would we have all those observing stations? Of course not, and over the ocean ships are much further apart so there is a greater need for more ship weather reports to improve the marine forecasts.

New True Wind Plotting Board and Calculator

For ships that have anemometers, we have made a new true wind plotting board. It is used the same as the one described in the NWSOH No. 1. The principle difference in the new plotting board is the background grid is green so it will show up better under the red bridge lights. on the back is a circular slide rule calculator suitably marked off for marine navigation. Figure 18 shows both sides. These are available through any PMO.

Alaska and Hawaii PMO's

Sounds good, doesn't it. Well, it isn't quite so, but close. The need for PMO functions has long been recognized by Hawaii and Alaska, and now they are going to try to perform part of the functions by assigning the below people part-time PMO duties. Yoy can help if you will be sure your Part-time PMO knows when you are coming into port. We need them and welcome them aboard.

Alaska

Mr. Felix Flara W/AR121x3
Alaska Region, NWS, NOAA
Box 23, 701 C Street
Anchorage, Alaska 99513
(907) 271-5121

Mr. Robert Bonner, OIC
Weather Service Office, NWS, NOAA
Box 37, BASE
Kodiak, Alaska 99619
(907) 487-2102/4338

Mr. Lynn Chrystal, OIC
Weather Service Office, NWS, NOAA
Box 427
Valdez, Alaska 99686
(907) 835-4505

Hawaii

Mr. Akimichi Kimura W/PR12x2
Pacific Region, NWS, NOAA
Prince Kuhio Fed. Bldg.,
300 Ala Moana Blvd.
Mail: P.O. Box 50027
Honolulu, HI 96850
(808) 546-5688

COOPERATIVE SHIP PROGRAM CERTIFICATE

Figure 19--PMO James Mullick presents a certificate for participation in the Voluntary Observing Ship program to Chief Mate, W. Brocco; Deck Cadet A. Sing, and Second Mate, R. D. Graxia of the PRESIDENT LINCOLN, American President Lines.

PORTS - PORT OBJECTIVES FOR REAL TIME SERVICE

This new National Ocean Services (NOS) initiative will provide the framework for establishing a network of automated tide gages and weather sensors within harbors which will display readings at a central location. These networks are to be managed by commercial enterprises and will charge a fee for actual water level and wind readings around the harbor and short term forecasts of wind and water level. These data and other meteorological elements are to be made available to the local NWS weather office for local forecast enhancement and data archiving.

The next logical step will be to involve ships in reporting weather in, approaching, and leaving the harbors. This will allow mesoscale (small scale) marine forecasts that should make the harbors safer and more profitable to all marine interests. Conceivably ships would be able to load within small draft margins with this improved realtime information. Better local weather forecasts for the harbors would save considerable time for longshoreman and reduce weather damage to cargoes.

PORTS Work Shop Calendar

October 16	New Orleans, LA
November 30	Anchorage, AL
January, 1985	Long Beach, CA

Tips to the Radio Officer

Julie L. Houston
National Weather Service, NOAA
Silver Spring, MD

The January 1984 edition of Selected Worldwide Marine Weather Broadcasts has been printed. Sales to the public are available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The price of the publication is $5.50. Please refer to stock number 003-017-00517-8 when ordering.

CORRECTIONS TO WORLDWIDE MARINE WEATHER BROADCASTS (January 1984 Edition)

SPECIAL NOTE: Effective 01 August 1984 the U.S. Coast Guard Communication Station Boston/NMF will commence broadcasting the U.S. Weather Bureau forecast entitled West Central North Atlantic. This will be included on the scheduled 2670 Khz broadcast at 0440, 1040, 1640, and 2240 Universal Coordinate Time.

Page 14
Change: W_1 to W_m

Page 15
Change: $i_r i_x$ HVV to $i_R i_X$hVV, $Os_n T_w T_w T$ to $Os_n T_w T_w T_w$

Change: From Decode Section, south-easterly winds 22 to 37 to southeasterly winds 22 to 27.

Change: Note section to read, Complete information on this surface code, including tables for de-coding each element is found in the National Weather Service Observing Handbook No. 1. The handbook is supplied free to Marine Observers. Write to Jerome W. Nickerson to obtain a copy at 8060 13th Street, Gramax Building, Room 728, W/OTS21x2, Silver Spring, MD 20910 or Port Meteorological Officers.

Page 17
Change: FM 46.D to FM 46-IV.

Page 69

1700	Rota, Spain	AOK
1700	Thurso, Scotland	GXH

Change: North Atlantic west to North Atlantic east

1218 Niton England GNI should read:
1218 W Dover, Portland and Wight

1220 Lyngby, Denmark OXZ, should read:
1220 F Danis waters: Baltic off Bornholm, western Baltic, the Sound, Belt Sea, Kattegat, Skagerak and Vesterhavet

Page 115
Add:
0330
W, F
Northwest Pacific; Ocean area Equator - 50°N, west of 180°.
13113.2 (A3J)
NRV, Guam Marianas Is.

0705 Guam, Marinanas NRV
Change: Area Equator - 25°N, 130°E - 180° to Ocean area Equator - 50°N, west of 180°.

Add:
0930
W, F
Northwest Pacific; Ocean area Equator - 50°N, west of 180°.
6506.4 (A3J)
NRV, Guam Marianas Is.

Add:
1530
W, F
Northwest Pacific; Ocean area Equator - 50°N, west of 180°.
6506.4 (A3J)
NRV, Guam Marianas Is.

Add:
2130

W, F
Northwest Pacific; Ocean area
Equator - 50°N, west of 180°.
13113.2 (A3J)
NRV, Guam Marianas Is.

2205 Guam, Marianas NRV
Change: Area Equator - 25°N, 130°E - 180° to
Ocean area Equator - 50°N, west of 180°

Page 141
0000 WWA New Orleans WLO
Change: 0000 to 0300

0300 Forecast New Orleans WLO
Change: 0300 to 0310

0315 A(00) New Orleans WLO
Change: 0315 to 0250

0600 WA New Orleans WLO
Change: 0600 to 0900

0900 P18/36 New Orleans WLO
Change: 0900 to 0910

0915 A(06) New Orleans WLO
Change: 0915 to 0850

Page 142
1200 WWA New Orleans WLO
Change: 1200 to 1500

1215 K New Orleans WLO
Change: 1215 to 1440

1500 Forecast New Orleans WLO
Change: 1500 to 1510

1515 A(12) New Orleans WLO
Change: 1515 to 1450

1800 WWA New Orleans WLO
Change: 1800 to 2010

2100 P18/36 New Orleans WLO
Change: 2100 to 2020

2115 A(18) New Orleans WLO
Change: 2115 to 2000

Page 143
2200 SST (Thursday and Sunday)
New Orleans WLO
Change: 2200 to 2030

2200 SST (Tuesday and Saturday)
New Orleans WLO
Change: 2200 to 2030

2200 Loop New Orleans WLO
Change: 2200 to 2030

Page 154
Change: Frequency 7645 to 7647 under Frequency Column for the following times for NPN, Guam, Marianas Is.; 0030, 0040, 0235, and 0400

Add:
Frequency 18620 under Frequency Column for the following times for NPN, Guam, Marianas Is.; 0030 and 0040

Add:
0645
WA
Western North Pacific and Eastern Indian Ocean
4975 (OR)
7647 (OR)
10255, 13807.5
18620
NPN, Guam, Marianas Is.
16

Page 155
Change: Frequency 7645 to 7647 under Frequency Column for the following times for Guam, Marianas Is.; 0703, 0725, 0735, 1055, 1230 and 1240

0735 Guam, Marianas NPN
Change: P36 under Product Column to A36.

Add:
1200
K
Western North Pacific and Eastern Indian Ocean
4975 (OR)
7647 (OR)
10255, 13807.5
18620
NPN, Guam, Marianas Is.
16

Page 156
Change: Frequency 7645 to 7647 under Frequency Column for the following times for NPN, Guam, Marianas Is.; 1435, 1600, 1840, 1903, 1925, 1935, 2240 and 2255

1935 Guam, Marianas NPN
Change: P36 under Product Column to A36

Add:
Frequency 18620 to Frequency Column for the following times for NPN, Guam, Marianas Is.; 1435, 1600, 1840, 1903, 1925, 1935, 2240, and 2255

Page 158
Delete: 0000 Honolulu, HI, USA NPM

Add:
0002
S(00)
30°N - 60°N, east of 160°E.
4344.1, 8680.1
12728.1
17149.3
NMC, San Francisco, CA, USA

0102 San Francisco NMC
Change: 30°N - 60°N to 20°S - 30°N

0112
Change: 160°W to 160°E.

0122
Change: 40°N - 52°N, east of 135°W. to 30°N-60°N east of 160°E.

0132
Change: 28°S - 40°N, east of 136°W. to 30°N - 60°N, east of 160°E.

0500 Kodiak, Alaska NOJ
Change: 0500 in Time Column & Area Column to 0400
0550 to 0450 in area Column
4296, 8457 to 4298, 8459 in Frequency Column

0502
Change: 0502 to 0302
30°N - 60°N, east of 160°E. to
40°N - 52°N, east of 135°W.

0512
Change: 0512 to 0312
30°N - 60°N, east of 160°W. to
28°N - 40°N, east of 136°W.

0522
Change: 0522 to 0402
40°N - 52°N, east of 135°W. to
30°N - 60°N, east of 160°E.

0532
Change: 0532 to 0412
28°N - 40°N, east of 136°W. to
30°N - 60°N, east of 160°E.

Page 159
Delete: From NPM, Honolulu, HI, USA the following: 0704, 0718, 0732 and 0746.

1000 Kodiak, Alaska NOJ
Change: 4296. 8457 in Frequency Column to 4298, 8459

1200 Honolulu, HI, NPM
Change: Old frequencies to 2122, 4855, 8494, 9396, 14826, 21837

See Add: 1214, below left

Continuation of Page 159

Add:
1214
K
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1228
P(24)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1242
P(24)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1256
P(24)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1310
P(24)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1324
P(24)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1338
P(24)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1352
P(24)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1406
P(24)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1420
P(24)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1434
P(24)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1448
P(48)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1502
SST
40°N - 52°N, east of 135°W.
4344.1, 8680.1
12728.1
17149.3
NMC, San Francisco, CA, USA

1502
P(48)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1512
SST
28°N - 40°N, east of 136°W.
4344.1, 8680.1
12728.1
17149.3
NMC, San Francisco, CA, USA

1516
A(48)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1522
EXP
Experimental
4344.1, 8680.1
12728.1, 17149.3
NMC, San Francisco, CA, USA

1530
A(48)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1532
EXP
Experimental
4344.1, 8680.1
12728.1, 17149.3
NMC, San Francisco, CA, USA

1544
P(24)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1608
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1627
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1644
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1648
P(72)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1702 San Francisco NMC
Change: 40°- 52°N, east of 135°W to 20°S - 30°N, east of 160°W.

Add:
1702
P(72)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1712 San Francisco NMC
Change: 28°N- 40°W, east of 136°W to 30°N- 60°N, east of 160°E

Add:
1716
A
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1900 Kodiak, Alaska NOJ
Change: 1900 in Time Column and Area Column to 1800
1930 to 1830 in Area Column
4296, 8457 in Frequency Column to 4298, 8459.

Delete: 1904 Honolulu, HI NPM

1738
A
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1800
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1814
WRNNGS
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1830
SST
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1844
SST
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

1858
P(12)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

Add:
1912
P(12)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

Delete: 1918 Honolulu, HI, NPM

Add:
1926
P(12)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

Page 160
Delete: 1932 Honolulu, HI NPM

Add:
1940
P(12)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

Delete: 1946 Honolulu, HI NPM

Add:
1954
A
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

2002
K
4344.1,8680.1
12728.1
17149.3
NMC, San Francisco, CA, USA

2012
SST
30°N - 60°N, east of 160°E.
4344.1, 8680.1
12728.1
17149.3
NMC, San Francisco, CA, USA

2019
P(36)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

2022
30°N - 60°N, east of 160°E.
4344.1, 8680.1
12728.1
17149.3
NMC, San Francisco, CA, USA

2032
30°N - 60°N, east of 160°E.
4344.1, 8680.1
12728.1
17149.3
NMC, San Francisco, CA, USA

2033
P(36)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

2047
P(12)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

2101
P(12)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

2115
A
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

2129
P(36)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

2143
A
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

2157
P(36)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

2200 Kodiak,Alaska NOJ
Change: 4296, 8457 in Frequency Column to 4298, 8457

Add:
2211
P(24)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

2234
P(36)
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

2248
P(26)
North Pacific Ocean
22, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

2302
A
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

2324
A
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

2332
SST
20°S - 30°N, east of 160°W.
4344.1, 8680.1
12728.1
17149.3
NMC, San Francisco, CA, USA

2342
SST
30°N - 60°N, east of 160°E.
4344.1, 8680.1
12728.1
17149.3
NMC, San Francisco, CA, USA

2346
North Pacific Ocean.
2122, 4855
8494, 9396
14826, 21837
NPM, Honolulu, HI, USA
15

Delete: From NMC, San Francisco, CA USA: 2102, 2112, 2122, 2132, 2147, 2302, and 2312

Add:
2352
S(OO)
30°N - 60°N, east of 160°E.
4344.1, 8680.1
12728.1
17149.3
NMC, San Francisco, CA, USA

Contributed by Jerome W. Nickerson, MWS

TRANSMITTING WEATHER OBSERVATIONS

The Marine Observations Program depends upon the radio officers to transmit the weather reports as soon as possible. This is because the weather report is used, not only by the weather forecasters, but in the computer at the National Meteorological Center (NMC). The various computer programs have cut-off times. The cut-off time is when the computer stops accepting weather reports and starts the analysis. Weather reports received at NMC on (or very close to) the synoptic hours will be used in all of the computer programs and by the forecaster. The importance of getting the weather report transmitted immediately is recognized worldwide as shown by the following extract from ITU Radio Regulations, 1982, and from the ITU (CCITT) Instructions for the Operation of the International Public Telegram Service (1977).

(Reference: paragraph II-1.6.3.)

Article 61

Order of Priority of Communications in the Maritime Mobile Service and in the Maritime Mobile-Satellite Service

The order of priority for communications in the maritime mobile service and the maritime mobile-satellite service shall be as follows, except where impracticable in a fully automated system in which, nevertheless, category 1 shall receive priority:

1. Distress calls, distress messages, and distress traffic.
2. Communications preceded by the urgency signal.
3. Communications preceded by the safety signal.
4. Communications relating to radio direction-finding.
5. Communications relating to the navigation and safe movement of aircraft engaged in search and rescue operations.
6. Communications relating to the navigation, movements and needs of ships and aircraft, and weather observation messages destined for an official meteorological service.
7. ETATPRIORITENATIONS--Radiotelegrams relating to the application of the United Nations Charter.
8. ETATPRIORITE--Government radiotelegrams with priority and Government calls for which priority has been expressly requested.
9. Service communications relating to the working of the telecommunications service or to communications previously exchanged.
10. Government communications other than those shown in 8 above, ordinary private communications, RCT radiotelegrams and press radiotelegrams.

This certainly expresses the urgency for getting the weather reports that you get from the bridge transmitted. However, what about the weather observations that are made, but not sent to the radio room? The primary synoptic hours are 00, 06, 12, and 18 Z (GMT or UTC). Most of

the NMC computer products are geared to these times. If, because of your watch hours or any other reason, you cannot transmit the weather reports at these times, have the bridge send you weather reports on the intermediate synoptic hours of 03, 09, 15, and 21 Z, if any of these times fit your schedule. There are some computer programs that are geared to these times. In addition, the weather reports may be made and transmitted one hour early. This allows wide options for you and the mates to get together on a schedule to transmit the maximum number of weather reports. Please read the "Marine Observations Program" section of this issue for additional information on the importance of weather reports to you and your ship. We need your cooperation to get the ship observations on the weather maps.

The completed NOAA Form 72-4A's which you send to me with the NOAA Form 72-1A's "Ship's Weather Observations" are greatly appreciated. Incidentally, the form is being updated and any changes you would like to suggest should be included with the next mailing of forms from your ship. The new headings for the replacement 72-4A will read:

Reports to U.S. facilities only

Address:
0023089406
Note: Only the telex number is required. See "New INMARSAT Area"

OBS
Note: To U.S. Coast Guard radio stations. Some stations say they don't need that as weather messages are easily identifiable and they are relayed only to NMC.

OBS METEO WASHDC
Note: To approved commercial radio stations. Use only if US Coast Guard radio stations are unavailable. Also group the message into 10-character groups after the call sign.
Example: ABCD YYGGi 99L L L
$Q_c L_o L_o L_o i_R \overset{w}{x} \overset{a}{h} \overset{a}{V} \overset{a}{V}$
Nddff1s TTT ..... etc.

All other addresses will be as shown in the manual, "Radio Stations Accepting Ships' Weather and Oceangraphic Observations".

For those of you who are sending nighttime and coastal weather reports - thanks. Your ship weather report may be the only one within a thousand miles of your position and it is very, very important. For those of you who aren't sending nighttime and coastal weather observation-thanks, for those you do send. Next time when you are up at night for some reason, give us a thought. We're open all night, every night because you need a morning weather forecast.

NEW INMARSAT AREAS

Use telex number 0023089406 through U.S. CES for your address in the following areas:

Pacific - North of 25° south latitude and east of 160° east longitude to the coast.

Atlantic - North of 3° north latitude and west of 35° west longitude to the coast.

Southern Hemisphere - south of 60° south latitude.

All weather reports from these areas are free to ships using the 0023089406 telex number for the address

The Editor's Desk

HIGHWAY, TRANSPORT FATALITIES DOWN

Fatalities on United States highways and in all modes of U.S. transportation declined in 1983 for the fourth consecutive year, but the reductions were far below those registered in 1982, according to preliminary statistics released by the National Transportation Safety Board (fig. 20).

The highway death toll last year was 42,500, down 3.4 percent from the 44,018 highway fatalities in 1982. The 1982 total had been almost 11 percent below the previous year. Highway fatalities historically account for more than 90 percent of all transportation deaths.

There were 46,115 fatalities in all of U.S. transportation last year. This was a 3.8 percent reduction from the 1982 transportation toll of 47,936.

Safety Board Chairman Jim Burnett, in releasing the statistics for the opening of Transportation Week, commented:

"About 1,500 fewer persons died on our highways in 1983 than in 1982. But that reduction in a terrible highway toll had been more than 5,000 in 1982. Today, we still are killing more than 42,000 persons a year -- an average of 115 every day.

"Clearly, our highway safety progress has only begun, and there is obvious danger that the downward fatality trend will be halted or even reversed. Until we are far more successful in getting drunk drivers off the road, and getting many more vehicle occupants too use seat and shoulder belts, our highway safety record will continue to be dismal."

Total marine fatalities were down only slightly from 1,329 to 1,322. Commercial Marine dropped by almost 50%, from 158 to 82, but recreational marine rose from 1,171 in 1982 to 1,240 in 1983, or an approximate 6 percent rise.

	1982	1983
Highway*		
Passenger Cars	23,330	22,206
Pedestrians	7,235	6,800
Pickup Trucks and Vans	6,325	5,939
Large Trucks	789	791
Motorcycles	4,453	4,065
Pedalcycles	800	818
All Other	1,086	1,881
Total	44,018	42,500
Grade Crossings	607	575
Railroad		
Intercity:		
Passengers	9	4
Employees on Duty	74	60

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594

TRANSPORTATION FATALITIES*
46,115 IN 1983

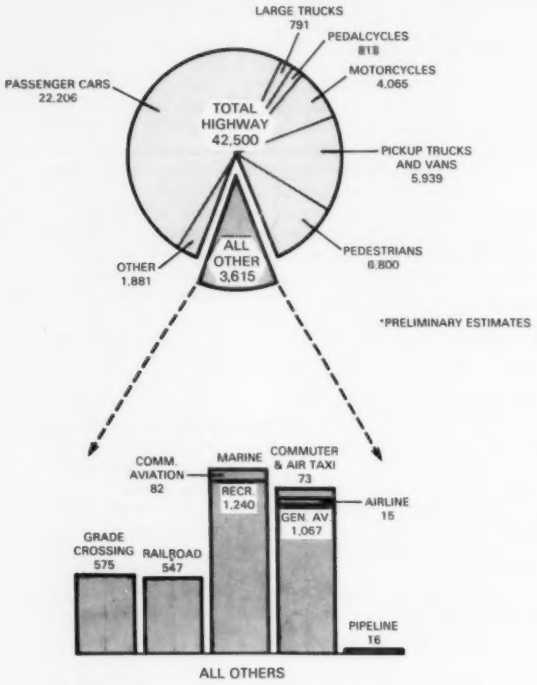


Figure 20.--Pie chart showing transportion fatalities.

Pedestrians and Others	429	434
Rail Rapid Transit:		
Passengers	8	39**
Employees on Duty	1	1
Pedestrians and Others	75	9**
Total	596	547
Marine		
Commercial	158	82
Recreational	1,171	1,240
Total	1,329	1,322
Aviation		
Airlines***	235	15
Commuter and Air Taxi	71	73
General Aviation	1,049	1,067
Total	1,355	1,155
Pipeline		
Gas	31	13
Liquids	0	3
Total	31	16
GRAND TOTALS	47,936	46,115

* All fatality totals include only drivers or other occupants of that type of vehicle.

** New reporting system counts as passengers, 34 persons killed while passing between cars, or in other "unauthorized areas." In 1982 such fatalities were classified as "pedestrains and others."

*** Does not include 6/2/83 accident, Cincinnati, OH, Air Canada, a foreign carrier.

MARINE FACSIMILE SCHEDULE

Effective June 25th, the 1700Z marine facsimile package from NMC, San Francisco was moved to 1715Z, i.e.:

Time	Area	Chart
1715Z		(2-minute leader)
1717	6	12Z Tropical Weather Analysis
1727	5	12Z Surface Analysis
1737	6	Satellite Imagery

This change was necessitated due to Coast Guard Voice Broadcast time overrunning into radiofacsimile broadcast time.

WEATHER MAP DISPLAY, PRESIDENT WASHINGTON

The attached photo is of the Weather Chart display (fig. 21) as you enter the bridge on board the new container ship PRESIDENT WASHINGTON of the American President Lines. The MASTER is Captain Gary Schmidt. The Deck Officers going on watch get an instant weather briefing just walking by this very informative display of the latest fax charts. These charts include the surface analysis from SFO (NMC) and Kodiak (NOJ), a satellite picture from NMC, two surface prognosis charts, wave height chart, a 500-mb analysis, a 500-mb prog, and ocean routes forecasts and prognosis.

The Captain, Radio Officer and Deck Officers up-date the board as charts are received aboard ship.

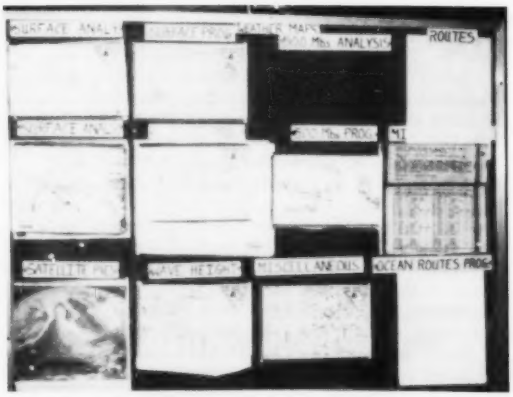


Figure 21.—Weather map display aboard the PRESIDENT WASHINGTON.

PEGGY DYSON RECEIVES AWARD

Known as the "Angel of the North Pacific," Peggy Dyson of Kodiak, Alaska, received a plaque from Capt. Roger Mercer of the NOAA ship Chapman, recognizing her 9 yr of service to mariners in the North Pacific and Bering Sea. Peggy broadcasts twice-daily National Weather Service radio forecasts and warnings from her Kodiak home. She also collects weather infor-

mation from ships via radio which she relays to the NWS and other ships in the area. She reports any Mayday calls and signs of trouble to the Coast Guard, and has been credited with saving many lives.

INTERNATIONAL SEARCH AND RESCUE PROGRAM SAVES 223 LIVES

Eight more lives have been saved by an international satellite-aided search and rescue program, officials at NASA's Goddard Space Flight Center, Greenbelt, Md., report.

The eight rescues bring to 223 the number of lives that have been saved since the program began in September 1982. All eight were maritime rescues.

Two of the incidents--the rescue of six fishermen in the Mediterranean Sea and the rescue of one sailor off the coast of California--occurred in February and March respectively.

The third incident took place in the Atlantic Ocean off the Azores on May 19. In that case, one sailor was rescued when a 6-meter (19-foot) Canadian yacht became disabled.

In all three cases, distress signals were heard by both U.S. and Soviet satellites. They were relayed to ground stations, which dispatched rescue forces. The United States has one satellite and the Soviets have two in the program, known as COSPAS/SARSAT. COSPAS/SARSAT are Russian and American acronyms respectively for Search and Rescue Satellite-Aided Tracking.

The six fishermen in the Mediterranean had abandoned their fishing vessel on February 2. It had been wrecked by foul weather with 50-kn winds and 7-m (23-ft.) waves. Because of the foul weather, a first search plane did not locate the crew. A second plane, however, finally spotted them 64 km (40 miles) from where their ship had sunk. Their lifeboat was within 7-km (4-1/2 mi.) of where the Mission Control Center at Toulouse, France, had indicated it would be, a testimony to the accuracy of the satellite system.

The incident off the California coast took place March 30. The 7.6-m (25-ft.) sailing ship, ARCTIC WIND, encountered difficulties 97 km (60 mi.) southwest of Monterey. The lone person on board had no voice communications and no survival equipment, according to Coast Guard sources, but signals from its Emergency Position-Indicating Radio Beacon (EPIRB) were picked up by the satellites. The signals were verified by overflying airliners, after which the Coast Guard Cutter CAPE HEDGE intercepted the vessel and towed it to San Luis Obispo.

To date, the satellite program, in which Canada, France, the United Kingdom, Norway, Sweden, Finland and Bulgaria also participate, has saved 115 persons in maritime and 107 in air emergencies. It also is responsible for saving the life of one person "on foot." That was a woman dog sled musher in Alaska who became ill on an 800-km (500-mi.) dog sled trek from Kotzebue to Point Barrow in April.

GREAT LAKES ICE ATLAS PUBLISHED BY NOAA

A comprehensive atlas of Great Lakes ice cover spanning the 20 winters from 1960 through 1979 has been produced for public use by the National Oceanic and Atmospheric Administration.

Developed at NOAA's Great Lakes Environmental Research Laboratory in Ann Arbor, Mich., the atlas is intended for use by federal and state agencies, the shipping industry, power companies, marine engineering firms, municipal and county planners, and others in the fields of operations and research requiring information about ice on the lakes.

The atlas is unique in that it is generated from a computerized data base. Its three major sections focus on ice-cover concentration, ice thickness at nearshore locations, and winter temperature severity. Charts show maximum, minimum, and normal ice concentrations on each of the five Lakes in half-month intervals; the range of ice thickness to be expected around the shorelines; and, 80-yr mean freezing degree-day values for 25 locations around the Lakes.

The "NOAA Great Lakes Ice Atlas" may be ordered from the National Technical Information Service, Department of Commerce, 5285 Port Royal Rd., Springfield, VA 21151, Order Number PB 84160811, price $13.00.

The ice concentration statistics and data base used in the atlas are available on nine-track, computer-compatible magnetic tape from the National Snow and Ice Data Center, CIRES, Campus Box 449, University of Colorado, Boulder, CO 80309. The Center is operated by CIRES on contract to NOAA's Geophysical Data Center.

MAGNITUDE AND IMPORTANCE OF GREAT LAKES IS STAGGERING.

By Dr. Albert G. Gallert

"Greatest lakes" and "Great Great Lakes" have been titles suggested by writers in attempting to adequately describe the magnitude and importance of the five connecting fresh-water lakes that are an invaluable international resource in the heartland of North America.

Table 8 indicates some of the major physical features of this waterway sustem, which has a surface area slightly larger than the states of New York and Pennsylvania combined and drains a surrounding land area about twice as big.

In terms of volume, the approximate 5,440 cubic miles of water in the lakes at their approximate lowest level is enough to cover our 48 conteminous states to a depth of about 9-1/2 ft-or an amount estimated by federal agencies to be about one-fifth of the world's fresh surface-water supply.

This vast reservoir with its related multiple benefits is one of the world's most recently formed major geographical features. It was created by ice scour of a continental glacier that fanned out from the Hudson Bay region, extending over the present lakes area and reaching to about the Ohio and Missouri Rivers.

After several advances and retreats of the mile-thick ice sheet, the first segments of the present-day lakes and their adjacent plains came into being about 15,000 yr ago. The pattern of the Great Lakes as we see them today has existed for only 2,000 to 3,000 yr.

The Great Lakes drainage basin is an area of contrasts and concentrations with respect to its utilization by man. These conditions are

Table 8.--Great Lakes basin data

	Superior	Michigan	Huron	St. Clair	Erie	Ontario	Great Lakes Basin
Drainage Basin Areas							
Total (in square miles)	81,000*	67,900	73,700	5,230	32,630	30,740	291,200*
Water Surface	31,700	22,300	23,000	430	9,910	7,340	94,680
United States	20,600	22,300	9,100	162	4,980	3,460	60,602
Canada	11,100	------	13,900	268	4,930	3,880	34,078
Land Area	49,300	45,600	50,700	4,800	22,720	23,400	196,520
United States	16,900	45,600	16,000	1,020	18,000	12,500	110,020
Canada	32,400	------	34,700	3,780	4,720	10,900	86,500

*The drainage areas of the connecting rivers add appoximately 4,600 square miles (water 170 and land 4,430) to bring the total area of the Great Lakes basin to 295,800 square miles. In addition, drainage areas diverted into Lake Superior are: Ogoki River 5,545 and Long Lake 1,630.

Volume of Water**							
In cubic miles	2,900	1,180	850	1	116	393	5,440

**Computed using navigation chart depths which are based on each lake's Low Water Datum.

Shoreline Distances							
Total (in miles)	2,726	1,638	3,827	257	871	712	10,579#
Mainland	1,729	1,400	1,850	130	799	634	6,824#
United States	863	1,400	580	59	431	300	3,756#
Canada	866	-----	1,270	71	368	334	3,068#
Islands	997	238	1,977	127	72	78	3,755#
United States	382	238	257	84	43	28	1,194#
Canada	615	-----	1,720	43	29	50	2,561#

#Totals include connecting rivers, their (a) mainland, U.S./Can. and (b) islands, U.S./Can.: St. Marys (a) 29/66, (b) 89/63; St. Clair (a) 28/30, (b) 0/5; Detroit (a) 30/30, (b) 39/33; Niagara (a) 36/33, (b) 34/3.

Lake Elevations‡**						
Mean Elevation (1900-1983)	600.58	578.24	578.24	573.30	470.40	244.70
Highest Monthly Mean (year)	602.02	581.04	581.04	576.23	573.51	248.06
Lowest Monthly Mean (year)	598.23	575.35	575.35	569.86	567.49	241.45

‡In feet above mean water level at Father Point, Que. on the lower St. Lawrence River (sea level)

Precipitation (1900-1983)							
Annual Average (inches)	29.90	31.41	31.64	---##	34.24	34.61	31.84

##Included in Lake Erie basin

Source: U.S.-Canadian Coordinating Committee on Great Lakes Hydraulic and Hydrologic Data, 1977

Prepared by:
Great Lakes Commission
2200 Bonisteel Blvd.
Ann Arbor, MI 48109

due to several factors. The basin extends over about 10 degrees of latitude-from the 41st to the 51st parallels-and over this broad range in latitude are differences in climate, bedrock, soil, and vegetation, which has resulted in sharp contrasts in the major types of economic pursuits. With respect to man's productive activities, agriculture and manufacturing are the prominent pursuits in the southern section of the basin, roughly between the 41st and the 44th parallels. Northward, the principle activities are mining, forestry, and grazing.

The enormous impact the Great Lakes have on the region and, in turn, on the nation's economy, can perhaps best be impressed on readers by asking them to try visualizing the development of the midcontinent area without these lakes. Among the significant factors to be considered: climate and weather, transportation patterns, kinds of agriculture, location of metropolitan centers, and recreational activities. Make a game of it -"The Great Unlakes of mid-America."

From The Christian Science Monitor.

Dr. Ballert, formerly a professor of geography at the UCLA, has been the director of research at the Great Lakes Commission in Ann Arbor, Mich., since 1956.

LETTERS TO THE EDITOR

WEATHER REPORTS TO WBH-29

The following memorandum was received from Donald Olson, the Port Meteordogical Officer, Seattle, WA.

Subject: Ship's, Tugs, and Fishing Boats Reporting to WBH-29, Kodiak, Peggy Dyson for the Month of April, 1984

I think its time we said "Thanks" to the many Deck Officers and Captains of vessels that call Peggy Dyson on a regular basis to pass on their latest weather information in plain language format. The forecasters from Alaska to San Francisco use this information in the daily high seas, off-shore, and coastal forecasts. Keep up the good work you are doing a great job. The following vessels reported for the month of April, 1984.

Vessel	No.	Vessel	No.
Craig Foss	11	Carolyn Jean	3
Sidney Foss	1	Arctic Sun	3
Justine Foss	14	Shawn Arrow	3
Stacey Foss	11	Pribilof	3
Sandra Foss	10	Royal Sea	2
Barbara Foss	4	Michael Dee	2
Leslie Foss	2	Peggy Jo	2
Ranger	11	Arctic Sea	2
Mars	18	Katrina EM	2
Invader	1	Alaska Swede	1
Commander	2	Midnight Sun	1
Crusader	8	Jerry Dee	1
Guardsman	8	Junior	1
Hercules	5	Major	1
Marine Exporter	1	Frances Lee	1
Marine Commander	13	Bluebird	1
Marine Pioneer	2	Vanguard	1
Daphne	4	Karaina	1
John Brix	17	Sunset Bay	1
All Alaskan	13	Royal Venture	2
Alpha Helix	5	Amberdawn	1
Clipperton	8	Makaka	1
Marine H	25	Pavolf	1
Krystal Star	11	Wolstad	2
Taurus	19	Dawn	1
Galaxy	17	Galewind	2
Sally N	16	Lady Helen	1
Norther Dawn	4	Ten Bears	1
Express	21	Debbie Del Rosa	1
Captain Julian	4	Golden Pride	1
Mia H	14	Judy B	1
Phaedra	6	Driksik	1
Juno	7	Impalla	1

Ships that also sent synoptic reports

Miller Freeman
Chapman
Chevron California
Sansinena II
Justine Foss (SEAS unit Aboard)

And a special "THANKS" to the one who makes it all possible - Peggy Dyson

STRONG WINDS IN COOK STRAIT

The following letter was received from Captain Gordon C. Grey of the NEW ZEALAND CARIBBEAN out of Auckland, New Zealand.

We have just received the Winter 1984 issue of Mariners Weather Log on board; and I was most interested to read the report from the research ship S.P. LEE concerning strong northerly winds off Cape Palliser, in New Zealand's Cook Strait.

Before joining Shipping Corporation of New Zealand about two years ago, I was serving as a deck officer in G.M.V. ARAHANGA. This vessel, owned by New Zealand Railways; is one of four large ferries maintaining a regular service between Wellington, and Picton in the South Island -- each ship makes four crossings of the Strait per day. The Cook Strait is well-known for bad weather; and in strong northerly conditions, violent gusts out of the valleys west of Wellington are quite frequent. I can remember one crossing in particular -- the wind in mid-Strait between Karori Rock and Tory Channel was around 40 knots from the NNW, but between Karori and Sinclair Head the gusts from between the hills frequently reached 90 knots! The terrain west of Wellington is very similar to that in the vicinity of Cape Palliser; and as with S.P. LEE, we experienced a series of sharp, very localized, barometric pressure drops -- each LOW being perhaps only a few hundred yards across, or about a mile or so at most.

Attached is a reproduction of a section of chart NZ 46, showing the courses taken by the ferries; and significant landmarks (fig. 23). The ships normally pass about 1 1/2 miles off the coast between Sinclair Head and Karori Rock.

The New Zealand Meterological Service has conducted research into this peculiar phenomenon, using mainly data from the four ferries, which send weather reports on each east-bound crossing, and more frequently if appropriate. The results of this research were published in the April 1983 issue of Marine Observer, the British counterpart of Mariners Weather Log. The article, by Mrs. B.A. Stainer of the New Zealand Meteorological Service, gives much information on the subject, including barogram copies from ARAHANGA, ARANUI and ARAMOANA. These latter show a great similarity to that from S.P. LEE.

Your friends i n S.P. LEE might be interested in obtaining a copy of the article from the New Zealand Meteorological Service (P.O. Box 722, Wellington) or from the British Meterological Service (through Her Majesty's Stationery Office, P.O. Box 276, London SW8 5DT). Indeed, the article could be of interest for publishing in a future issue of Mariners Weather Log. S.P. LEE's account would no doubt be of interest to the New Zealand Meteorological Service, as their research did not cover the area east of Wellington -- due mainly to a scarcity of ship reports in that area.

I trust that the foregoing is of interest to you; and I look forward to your reply. As I shall shortly be leaving NEW ZEALAND CARIBBEAN, I can be more easily contacted at my home address.

With all good wishes to yourself and to all at M.W.L.,

Sincerely,

Gordon C. Gray

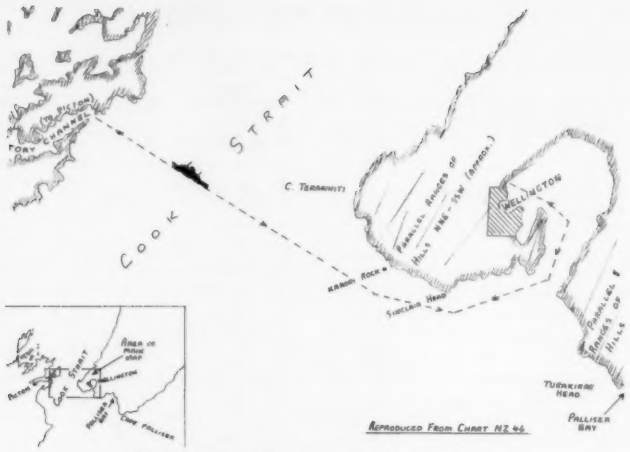


Figure 23.--Chart of Cook Strait.

MARINE WEATHER REVIEW

The Weather Logs combined with the cyclone tracks, U.S. Ocean Buoy climatological data, gale and wave tables, and mean pressure patterns are a definitive report on the weather systems and primary storms which affected the North Atlantic and North Pacific Oceans during this 3-mo period. Hurricane Alley lists and describes tropical cyclones worldwide. Unless stated otherwise, all winds are sustained winds and not gusts; all times are G.M.T.

North Atlantic Weather Log

January, February and March 1984

WEATHER LOG, JANUARY 1984--The primary storm track from the U.S. East Coast to the Norwegian Sea closely matched climatology. South of Iceland some storms turned eastward toward the Shetland Islands. South of Newfoundland a secondary track broke off eastward to the English Channel. A secondary track crossed northern Quebec and Ungava Bay to Frederikshab, Greenland and the Denmark Strait. There is no climatic comparison to this track. There were no significant cyclone centers over the Mediterranean Sea. Centers over the Great Lakes were early in the month.

The monthly mean pressure pattern was much more intense than normal (fig. 24). The Icelandic Low was 988-mb near Keflavik compared to the 1001-mb climatic Low near 60°N, 35°W. The Azores High was 1035-mb near 37°N, 27°W versus the climatic 1020-mb near 30°N, 20°W. This was a 47-mb pressure gradient between the two centers compared to the climatic 19-mb. The climatic gradient would be approximately 1-mb per 100 mi. The actual gradient this month was approximately 1-mb per 36 mi. The normal high pressure over the Central Mississippi

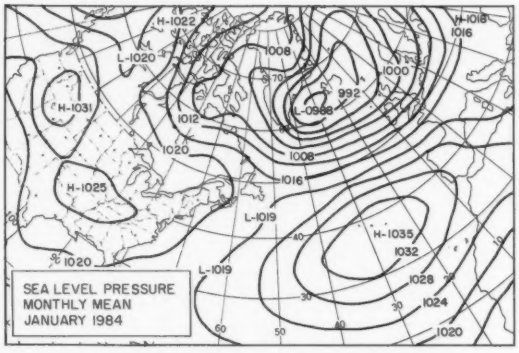


Figure 24.-- Mean sea-level pressure.

Valley was 1025-mb, 5-mb higher than normal.

There were two large anomaly centers of near equal value but opposite signs (fig. 25). One was minus 16-mb near Keflavik and the other was plus 17-mb near 38°N, 29°W. The zero isoline approximated a line connecting the Brest Peninsula to Kap Farvel to Cape Chidley.

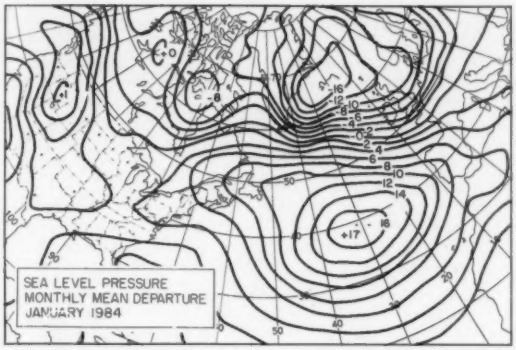


Figure 25.--Mean monthly sea-level departure.

The 700-mb upper-air pattern was also more intense than climatology. The Low was near normally located over Baffin Island at 2,580 m. The high-pressure center was 3,233 m near 35°N, 32°W. This was a gradient of 653 m verses 485 m from climatology. A trough line stretched southward across the eastern shore of James Bay, Cleveland, Ohio, and Tallahassee, Florida. Another trough stretched southward from Helsinki to Athens. There was a very tight gradient between the High and Kap Farvel. There was little indication of ridging north of latitude 50°N, and none as climatology shows over the European west coast.

A few climatology items. On the 11th,1918 a tremendous blizzard completely immobilized the Midwest, stopping mail service for 2 weeks. The vast storm moved through the Great Lakes and Ohio Valley, winds reached 60 mi/hr at Toledo. The temperature dropped from 28°F to 15°F during the passage of the cold front.

On January 23, 1780, a British Army thermometer at New York City registered 16°F below zero. During that famous hard winter the harbor was frozen solid for 5 weeks and the post was cut off from sea supply.

On January 28 in 1922 the Knickerbocker snowstorm immobilized Washington, D. C. with 28 in of snow in 32 hr. Snow caused the roof of the Knickerbocker movie theater to collapse killing 96 persons.

On the 30th, 1977, the great Buffalo blizzard abated after 3 days. The storm added a foot of new snow to the 33 in already on the ground. Winds gusted to 75 mi/hr. with the visibility near zero, and produced snow drifts as high as 25 ft. The wind chill was minus 50°F.

Extratropical Cyclones--The month started out with a large intense storm over the northern shipping lanes that was described in the December Log. The last half of the week the Azores High was up to 1043-mb and a strong LOW was over Iceland.

The second week found a LOW over the Denmark Strait. At midweek another LOW from off the east coast of the United States reinforced the storm. The Azores High was 1041-mb over the central ocean. The HIGH moved eastward the last of the week and a frontal wave moved across the top with strong winds.

Weak pressure centers predominated the third week with a strong LOW developing south of Iceland by the end of the week.

High pressure dominated the midlatitudes the first of the fourth week. A double centered cyclone was over the northern ocean. By midweek the Azores High was weakening and moving southeast. A frontal wave formed between two high pressure centers and intensified off Cape Finisterre. There was a severe LOW over the Labrador Sea the last of the week. The end of the month there was a parade of LOWS from the United States East Coast to Iceland.

The first storm formed as a frontal wave southwest of Bermuda on the 1st. At 1200 on the 3d the storm was 990-mb east of Cape Race. The platforms near 47°N, 48°W measured 48-to-58-kn south winds and seas up to 12-ft. At 1200 on the 4th the storm was 944-mb over the Denmark Strait. The VILGELM PIK (56°N, 36°W) had 68-kn south winds and 26-ft seas which later increased to 33-ft. The NIVI ITTUK (59°N, 32°W) radioed 60-kn west winds and 41-ft seas and by the 5th they called the seas 57-ft. The JOHAN PETERSEN (60°N, 25°W) measured 52-kn west winds and 39-ft seas. LIMA had 26-ft seas. On the 6th the storm turned southward and passed through the Skagerrak on the 7th. Then were 40-to-50-kn reports over the North Sea. The storm moved over the Baltic Sea on the 8th and continued inland. The BRITISH HUMBER reported 41-ft swell waves from the north near 58°N, 08°W on the outskirts of the storm.

A trough off the U.S. East Coast had existed for several days and was generating weak frontal waves and LOWS. On the 8th one of these continued to deepen and became a severe storm. The AUSTRAL PIONEER (38°N, 68°W)measured only 20-kn winds from the northwest, but had 33-ft swell waves from the south. The WGZL (47°N, 48°W) measured 50-kn southwest winds. At 1200 on the 9th, the storm was 978 mb near 52°N. 48°W. The WGZL had 54-kn winds. The AMERICAN ACCORD (41°N, 62°W) had westerly 45-kn winds and 20-ft waves. By 1200 on the 10th the storm was north of Iceland at 960 mb. It had overtaken and absorbed a stationary LOW over the Denmark Strait. The MATCO AVON (60°N, 01°W) measured 50-kn south winds, and 30-ft swells. The storm was racing northeastward and was over the Greenland Sea on the 11th. In the meantime another LOW was left behind south of Angmagsalik, and a wave had formed in the main circulation south of Iceland, Several ships had winds over 50-kn. The WALTHER HERWIG ((57°N, 10°W) measured 64-kn winds from the west-northwest, the STUTTGART EXPRESS (52°N, 18°W) reported 23-ft seas and 30-ft swells with 55-kn west winds. The original LOW was over Svalbard and the frontal wave was the primary LOW affecting ships. At 1200 on the

12th it was 964-mb near Molde, Norway. Another frontal wave was roaring eastward through the primary circulation. A RIGG at 48°N, 08°W had 60-kn northwest winds and 30-ft waves. Others had storm-force winds and waves up to 33 ft. This LOW was gone on the 13th.

Three people died as high winds, reportedly up to hurricane-force in places lashed Scotland the night of the 11th. The MARJAN was in danger of being blown ashore and two fishing vessels were blown ashore. The CONSTANT FRIEND grounded at Ardentraive Bay. The B.P. WARRIOR, EVA THOLSTRUP and NORTH ARMAC all had heavy weather problems.

Monster of the Month--As a 1044-mb Bermuda High moved eastward on th 11th an elongated LOW formed off the U. S. East Coast. There were three waves in the LOW at 1200 (fig. 26).

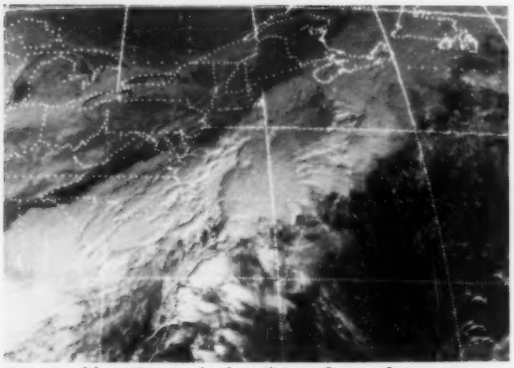


Figure 26.--None of the three frontal waves are obvious on this satellite image of 1500. They were identified by SHIP OBSERVATIONS. NOAA

Quite a few ships reported winds over 45-kn. The SYN PULKU (33°N, 55°W) measured east 68-kn winds. The NZXQ(33°N, 78°W) had 75-kn west winds. A RIGG at 44°N, 60°W measured 55-kn south winds and 21-ft seas. At 1200 on the 12th the 978 mb wave had rushed to 55°N, 34°W. CHARLIE had 45-kn winds and 24-ft seas while LIMA earlier had 53-kn winds and 25-ft seas. SEDCO 706 (47°N, 48°W) measured 57-kn south winds and 18-ft seas prior to frontal passage. The STUTTGART EXPRESS (51°N, 21°W) was in the mainstream with 48-kn west winds,10-ft seas, and 25-ft swells. The storm was 952-mb near Bergen, Norway at 1200 on the 13th. Many ships and platforms reported high winds and seas. The SERENIA (56°N, 04°E) reported 70-kn southwest winds, 49-ft seas, and 43-ft swells. The MARIE MAERSK (55°N, 05°E) reported 70-kn southwest winds and 49-ft seas, a French ship, the FNDV,(48°N, 06°W) measured west 80-kn winds and 23-ft waves.

A quasistationary LOW near the Denmark Strait was holding the circulation to the west, as this LOW moved toward Nordkapp. On the 14th a wave formed just west of Scotland and moved across the Baltic Sea (fig. 27). There were gale-force winds across the United Kingdom, the coasts of the Low Contries and

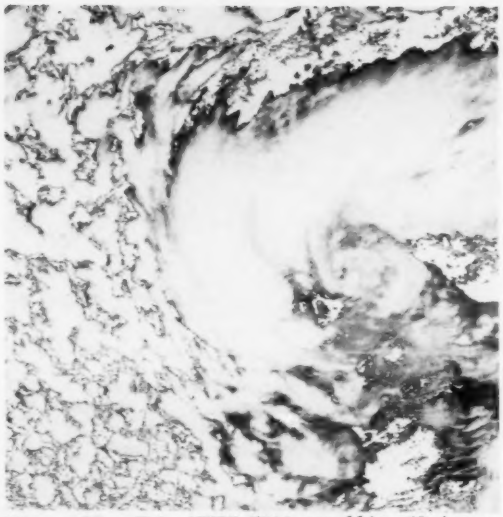


Figure 27.--This AVHRR NOAA satellite IR image shows the frontal wave in detail.

Norway. CHARLIE had 45-kn winds with 30-ft waves, LIMA had 50-kn and 24-ft waves. The Netherlands ship PIQA (45°N, 08°W) measured 44-kn winds from 240°, 15-ft seas, and 39-ft swells, THE DISKO (59°N, 31°W) had 70-kn west winds but only 23-ft seas. There were a lot of high wave reports on the 15th with the winds generally below 50-kn. They were in a general area of 45° to 60°N latitude and 30°W longitude eastward to the coasts. On the 16th this storm was out of the primary shipping area as another approached from the west.

The ANNE SOPHIE was blown onto rocks off the Irish Coast on the morning of the 13th. A helicopter rescued the crew in winds reported up to 85-kn and 20-ft waves. Parts of Glasgow were flooded by 4 ft of water. Hurricane-force winds struck Denmark and ferry routes and air traffic were cancelled. Three train tank cars full of sulfuric acid were blown over. Many thousands were without power in Sweden due to winds gusting to 80-kn with sleet and freezing rain.

Early on the 14th the RUY JUN off Brest had engine failure and later lost steerage. Vessel was abandoned by helicopter safely by the six crew members. Again fierce winds struck Britain and the northern Europe. Twelve people were killed in the storm. A 375-ft high power station cooling tower collapsed near Liverpool. Winds near 100-kn were reported off the west coast of Jutland. The DANA OPTIMA lost 40 containers overboard. She later lost control and drifted between the Gorm and Tyra oil fields. The MAYIS went aground near Heysham. The PERGO grounded near Dunbar. The BEERBERG lost 14 containers in the River Weser estuary. The MALAYAN EXPRESS tore loose from her mooring at Bremerhaven. The SIGAL lost 4 form containers off Brest. The KUNDA broke from tow off the Sweedish coast. The KIFANGONDO lost four containers while entering

Gothenburg. The MONTE ALTO grounded in the River Elbe. The ZEEPARD was missing off the east coast of England. The BARKEN suffered cracks on deck. The MARKAL L.had to relash cargo. The TITO CAMPANELLA disappeared with her 24 crew members 70 mi north of the Galician Coast. The SIGAL had damage.

This LOW formed in an inverted trougv west of Bermuda on the 13th. At 1200 on the 15th it was 1000-mb at 45°N, 40°W. The WGZL (47°N, 48°W) measured 72-kn north winds. The CGCV (46°N, 63°W) had 61-kn winds. On the 16th this frontal wave moved through the southern circulation of the previously described storm. At 1200 it was 976 mb near 56°N, 08°W. There were many reports of winds over 40-kn north of latitude 45°N. The BUFFALO (54°N, 04°W) measured 60-kn west winds, 33-ft seas, and 38-ft swells. The storm was near Oslo on the 17th. There were winds of 40 to 50 kn reported over the North Sea. LIMA still had 26-ft seas on the 18th but the storm was well inland.

The SAXON STAR was hit by a crane in high winds. The AMERICAN HIGHWAY struck a breakwater when leaving Copenhagen. The SIGRID WEHR had damage due to high seas. The EVER SPLENDOR diverted to Brest due to heavy weather.

On the 19th there were a series of waves or a front off the U.S. East Coast. They were not strong enough to track any one of them. On the 20th one east of Cape Race continued to deepen. By 1200 on the 21st the storm was 974-mb near 56°N, 17°W. The ESSO NORMANDIE (54°N, 11°W) measured 66-kn southeast winds and 33-ft waves. The CHIDORISAN MARU (49°N, 32°W) measured 46-kn west winds and 20-ft waves, The storm was moving northward east of LIMA at 0000 on the 22d. At 1200 it was950-mb over the west coast of Iceland. There were many wind reports over 50 and several near 70-kn, also waves over 30 ft. A platform near 58°N,00°E reported 41-ft seas out of the southeast. Among others these four ships had winds of 65 to 70 kn, ARNARFELL, EYRARFOSS, NUNGU ITTUK, and SELA. On the 23d this storm was west of Iceland and remained stationary until dissipating on the 25th.

In the meantime a frontal wave was racing eastward through the southern circulation. It had developed into a 968-mb storm over Scotland by 1200 on the 23d. There were several winds over 50-kn.The LIVERPOOL BAY (47°N, 07°W) measured 52-kn west winds, 20-ft seas, and 33-ft swells. At 1200 on the 24th the storm was over Hamburg. The winds over the North Sea were generally gales. The LIVERPOOL BAY was approaching the English Channel with 52-kn west winds, 20-ft seas,and 36-ft swells. ROMEO had 30-ft waves and a ship as for south as 34°N, 14°W reported 43-ft swells. The storm was gone on the 25th.

The RADIANT MED sank 14 mi south of Guernsey on the 23d in force 11 winds. Nine of the crew of 25 were rescued. The following ships were beached or blown ashore; NAVENA, KILDONAN VENTURE, and drilling platform ALI BABA. The CAP ITEA and SAFINA-E-BARKAT had weather damage. COCKCROW had weather damage and diverted to the Faroe Islands where she grounded. The LAMARA had an engine breakdown 150 mi. southwest of Brest.

An inverted trough between two HIGHS generated this storm on the 23d. The LOW slipped between the two HIGHS on the 24th. By 1200 on the 25th the storm was 970-mb near 49°N, 17°W. There were some very high winds and waves with this young storm. The TFL EXPRESS (48°N, 20°W) measured 60-kn winds with 33-ft waves, ROMEO measured 68-kn west winds and 59-ft waves. The LONDON VICTORY nearby (47°N, 18°W) reported 70-kn winds. On the 26th ROMEO was still measuring up to 60-kn winds and now the waves were up to 66ft. The MUSSON (45°N, 22°W) reported 36-ft seas. The storm was over Lands End at 1200. ROMEO still had 46-ft waves. Many ships had storm force winds and waves over 30 ft. On the 27th the storm started deteriorating fast and was lost on the analysis on the 28th.

This LOW formed on a front over Quebec Province on the 25th. There was a large circulation around the original LOW that was already affecting the waters off the Maritime Provinces. The TFL LIBERTY (42°N, 52°W) measured 48-kn south winds. The WEST VENTURE (47°N, 49°W) measured 64-kn south winds and 15-ft seas. At 1200 on the 27th the storm was 952-mb near 55°N, 49°W. ThePACIFIC CHALLENGE (49°N, 36°W) measured 58-kn southwest winds with 17-ft seas. The BRITISH TAY (48°N, 36°W) reported only 29-kn winds with 44-ft swell waves. The storm weakened on the 28th but there were still high winds. The DART AMERICANA and PACIFIC CHALLENGE, both near 49°N, 34°W measured 70-and 60-kn west winds respectively. The AMERICAN EXPLORER (54°N, 16°W) had 30-ft. swells. The LOW stalled west of Iceland on the 29th.

This frontal wave formed over Cape Hatteras on the 27th and traveled northeastward up the coast. At 1200 on the 28th the storm was 980-mb near 44°N, 60°W. There were a few storm-force wind reports. The storm was near Kap Farvel at 1200 on the 29th. The winds were now in the gale category but there were swell reports of 30-ft. The PACIFIC CHALLENGE (48°N, 39°W) measured 40-kn southwest winds and 30-ft swells. On the 30th a second low-pressure center formed to the east and became the primary center. The CAPE RODNEY (52°N, 26°W) had 52-kn west winds, 26-ft seas, and 36-ft swells. The storm rapidly dissipated on the 31st but the APPLEBY (48°N, 17°W) had 30-ft swells.

CASUALTIES-- The following ships suffered ice damage; DONA ROSSANA, SCANSPRUCE, URANIA, MOHAWK, JOHN GUY, CROWN BRIDGE, and DYNAMIC TRADER.

The JERVIS BAY was snake bit. She broke tow in 60-kn winds in the English Channel on the 3d. She went adrift again on the 13th in the Bay of Biscay in heavy weather. She ran onto rocks in the outer port of Bilbao on the

Figure 28.-- The JERVIS BAY ran aground and broke in two in the outer port of Bilboa, Spain. WIDE WORLD PHOTO.

24th again in strong winds and broke in two (fig. 28).

The ANDES VOYAGEUR had weather damage on a voyage from Antwerp to Montreal and ice damage going back to ANTWERP. The BARRA sank off Cape Silleiro. All 14 crew members were rescued by the NAVITOSA. A waterspout hit the drilling platform J. Storm XVII in Ship Shoal Block 232. The LARIMAR lost containers overboard.

The BIRGIT ABBAN grounded in Bilbao and the GINESTRA was stranded at Zuara in heavy weather. The PELASGOS and BASKA developed dangerous lists. The SKANDERBORG took a heavy sea half flooding the engine room.

The MARINA HEEREN picked up 13 survivors from the MONTE SINAI which had sunk west of Morocco on the 28th. They were taken off a life-raft in a force 10 storm. The AYUBIA had had damage from the 27th to 31st. The PUNTA ANGELES had damage on the 29th. The tailshaft of the VENTURE broke in heavy weather on the 9th. The MARITIME BARON suffered damage on the 15th.

Bad weather affected oil operations in the North Sea this month. The PHILLIPS ARKANSAS collided with the MAERSK DISPATCHER on the 6th. The PHILLIPS OKLAHOMA had a hawser and hose break. The production platform EKOFISK A. was forced to stop production after being hit by a freak wave. The wave was estimated at 25 meters. Another platform in Ekofish Center was hit by high waves and damaged the same day.

The following ships reported weather damage: CLUDAD DE ITAGUI, PARAGUAY SPEED, AUGUST THYSSEN, CONTENDER BEZANT, ESRAM, ALISON, L'ALBA, and FIRST JAY.

WEATHER LOG, FEBRUARY 1984--There was a proliferation of storms this month, but there were not as many severe storms as usual. There was no doubt about the primary track, it was from the southeast United States to Newfoundland to the east coast of south Greenland. There were three cutoff LOWs along latitude 35°N. Three cyclones were over the Mediterranean. Storms

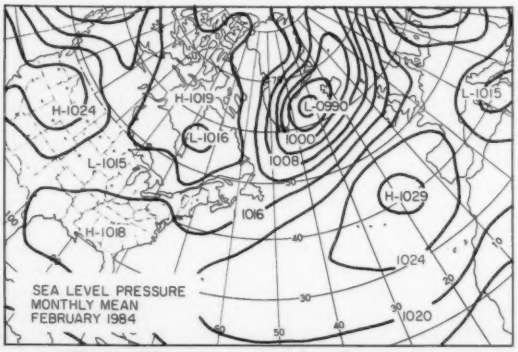


Figure 29.-- Mean sea-level pressure.

crossed the Great Lakes from the southwest clockwise to the northwest. Storms over Canada north of the Lakes moved west to east. Few made it to the salt water.

The monthly mean sea-level pressure pattern was near normal in configuration but not pressures (fig. 29). The Icelandic Low was 990-mb near 64°N, 33°W. This was 13-mb lower and about 300-mi northeast of the climatic Low. The Pacific High was 1029-mb near 40°N, 19°W. This was 9-mb higher and 700-mi northeast of the climatic center. The Asian High was 1046-mb with two centers. The western center was shifted about 1,700-mi west of climatic position. There was an anomalous 1015-mb LOW over the Great Lakes.

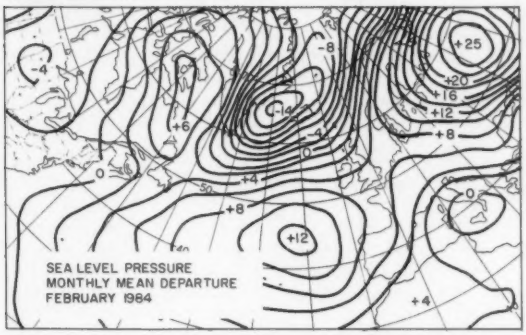


Figure 30.-- Mean monthly sea-level departure.

There were three very prominent pressure departure centers (fig. 30). The two most important for merchant ships were a minus 14-mb center west of Iceland and a plus 12-mb center near 43°N, 21°W. The zero isoline followed the west coast of Greenland south to about 55°N then turned east-northeastward to the Faeroe Islands, then northeastward to Bjornoya in the Barents Sea. There was a large positive anomaly center of 25-mb near Gorkiy, USSR. A minor minus 4-mb center was over Minnesota.

The 700-mb upper air circulation center was 40-m lower than the normal and shifted southeastward from Somerset Island to near Jakobshavn on the west coast of Greenland. A mean trough line extended from the Low to Goose Bay than southwestward along the west slope of the Appalachian Mountains. The upper flow was generally from the southwest over the primary shipping lanes. The normal ridge off the European West Coast was more accentuated than usual.

Some Climatology. On February 8, 1835 the southeastern U.S. had a severe cold wave. The temperature dipped to 8°F at Jacksonville, Fla. and 0°F at Savannah, Ga. On the 9th in 1934 the mercury dipped to minus 51°F at Vanderbilt, Mich. and 52 below zero at Stillwater Reservoir, N.Y. These are both State records. On the 15th in 1895 a Gulf snowstorm produced 6-in of snow at Brownsville, Texas, 15-in at Galveston, and 2-ft at Rayne, La. Snow fell at the very mouth of the Mississippi.

Extratropical Cyclones--The month started out with a large 1038-mb Azores High. A severe LOW was moving from the Canadian Maritimes to the Denmark Strait. The second half of the week a 1048-mb HIGH came off the Maritimes. There were strong LOWs over the Norwegian Sea. At the end of the week the HIGH had merged into a 1048 Azores High. There were three LOWs along the northern shipping lanes.

A strong Azores High continued into the second week and there was severe weather over the United Kingdom and the Low Countries. At midweek there was a LOW over the Mediterranean. The Azores High was moving northeastward to France. Another HIGH was off the U.S. Coast. At the end of the week there was a 1048-mb HIGH over Denmark and a 1038-mb HIGH 700-mi southeast of Cape Race. LOWs were moving through the Denmark Strait.

The third week high pressure persisted over Europe with the center near Moscow. A 1040-mb HIGH was near Cape Race. A cutoff LOW was west of the Azores. At midweek a LOW was over Iceland. The pressure gradient south of latitude 50°N was weak as pressure systems broke down. High pressure still persisted over Europe at the end of the week. There were several weak LOWs with one severe LOW over Ireland.

The fourth week started with the Azores High building. There were LOWs over Cape Hatteras and Iceland. The High was moving northeastward at midweek. A LOW was over the Mediterranean. At the end of the week there were many centers over the ocean. The Asian High was 1050-mb near Gorkiy, USSR stretching to England.

The end of the month found several large LOWs dominating the salt water.

The first storm of the month was over Cape Hatteras the last day of January but did not become significant until February (fig. 31). At that time it was 976-mb over Nova Scotia. Within the 5° surrounding about 43°N, 60°W there were several wind reports of 50 to 60-kn. The VCWB at 42°N, 65°W had 62-kn winds and 30-ft seas. The PACIFIC CHALLENGE (47°N, 57°W) measured 60-kn west winds and 33-ft swells. At 1200 on the 2d the storm was 960-mb at 62°N, 34°W. CHARLIE had 24-ft waves and LIMA 33-ft. The SEA-LAND PRODUCER (47°N, 12°W) had 50-kn winds and 25-ft waves. The BRIDGEMAN (51°N, 05°W) reported 49-ft swells. The LOW gradually deteriorated over the Denmark Strait.

The following ships apparently suffered weather damage in this storm. The AQUARIUS lost

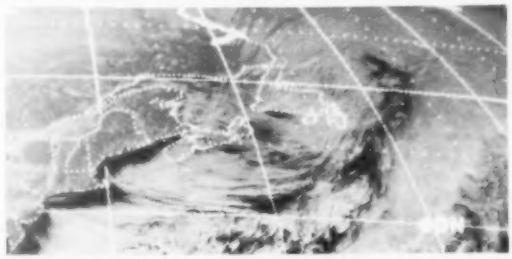


Figure 31.-- Cold air flowing over the warmer water caused instability and feed the storm. NOAA

22 containers and 3 Caterpillar tractors plus 1 boiler overboard about 50-mi northeast of Cabo Villano. The TALAVERA and WAVIGATOR ranged against each other in high winds.

The next storm began as a frontal wave between two HIGHs on the 2d, southeast of Newfoundland. On the 3d it was in the southern circulation of the storm above. The AMERICAN LEGACY measured 45-kn southwest winds and 25-ft swells near 43°N, 31°W. At 1200 on the 4th the storm was 968-mb near 60°N, 13°W. The CHELSEA (43°N, 38°W) found 60-kn northwest winds and 20-ft waves. The KWXK (49°N, 16°W) measured 60-kn, 290°, winds with 17-ft seas. On the 5th CHARLIE had 36-ft swells. There were many winds over 50-kn and several over 70. The BREITLING (57°N, 15°W) had 71-kn west winds. No waves were reported. The storm was 956-mb near 67°N, 02°W at 1200.

On the 6th a second LOW formed over Iceland and this became the primary circulation. At 1200 it was 952-mb near 64°N, 08°W. There were many high wind reports, some up to 75-kn. The ERNST TELMAN (49°N, 08°W) measured 75-kn west winds. The COMMANDANT BLAISON (48°N, 05°W) found only 36-kn winds but the swells were 39-ft. The CONTRACT MERCHANT (51°N, 25°W) had 52-kn winds, 13-ft seas, and 46-ft swells. At 1200 on the 7th the storm was 964-mb at 64°N, 05°E. There were many gale-force and stronger winds over the North Sea. The DOCTOR LYKES (50°N, 13°W) had 50 kn out of the west and 30-ft waves. The CERES (46°N, 06°W) measured only 21-kn with 33-ft swells. ROMEO had 28-ft seas. There were still some high winds over the North Sea as the storm moved inland. The storm brought 80 mi/hr winds to the Winter Olympics.

This storm wrought major damage to northern Europe. The major rivers of Germany overflowed their banks resulting in millions of dollars damage. Winds gusting to 160-mi/hr were reported over high elevations in Bavaria. The following ships apparently had weather damage associated with this storm. A ferry on the Dart River in England broke loose in high winds and damaged many small boats. The OCEAN WIND and IRISH MAPLE contacted each other. The ANGELONIA and BRUNITA developed heavy lists. The EURCO R. grounded. The MIDNIGHT SUN capsized off Brittany. Eleven crewmen of 19 were rescued.

This storm came off the Gulf of Mexico coast. It was over Cape Hatteras at 0600 on the 5th. There were already some storm-force winds (fig. 32). The HOEGH SUN (43°N, 59°W) had southerly 52-kn winds and 30-ft seas. At 1200 on the 6th the storm was 991-mb over the Gaspe Peninsula. The ARGONAUT (39°N, 60°W) had southerly 50-kn winds, 15-ft seas, and 25-ft swells. The WGZL (47°N, 48°W) measured 49-kn south winds and 17-ft seas. The storm was east of Kap Farnel at 1200 on the 7th. The ANDES DISCOVERER (48°N, 23°W) had 49-kn winds, 18-ft seas, 30-ft waves. LIMA measured 48-kn wind and 20-ft waves. The LOW dissipated early on the 8th.

As a trough from an earlier LOW moved over

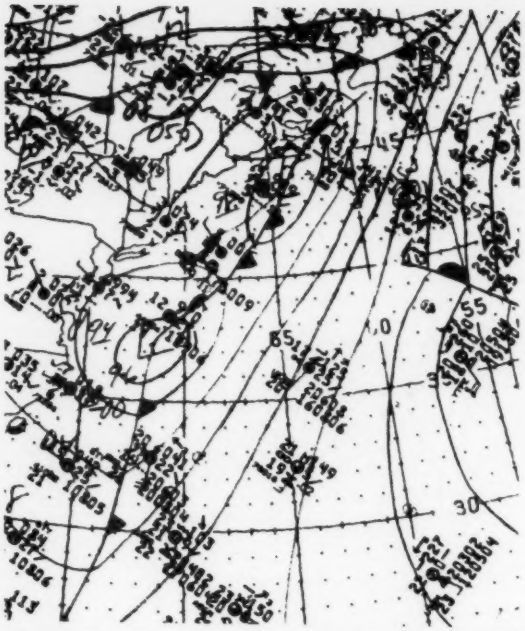


Figure 32.--The analysis of the storm area at 1200 on the 5th.

the Appalacian Mountains a new cyclone formed over the Carolinas on the 6th. At 12000 on the 7th the storm was 989-mb near 42°N, 63°W. The CHELSEA (42°N, 55°W) found 55-kn south winds and 20-ft waves. The CHESAPEAKE (34°N, 74°W) had 50-kn winds. At 1200 on the 8th the 982-mb storm was near 54°N, 52°W. The WEST VENTURE (47°N, 49°W) measured 50-kn south winds and 18-ft waves. The JOKULFELL (54°N, 43°W) had 48-kn south winds. The BREITLING (53°N, 30°W) reported 60-kn south winds on the 9th, but the storm died on the southern tip of Greenland.

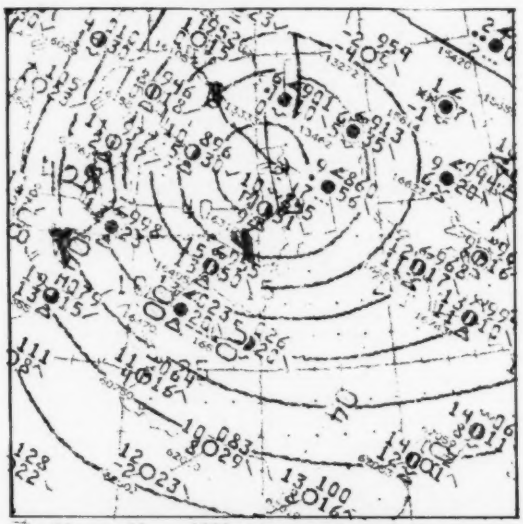


Figure 33.-- 0000 February 9 analysis.

On the 7th and 8th there was strong northerly flow over France and Germany into the Mediterranean. Cyclogenesis occurred late on the 8th and the 0000 analysis of the 9th had a 980-mb large LOW centered near Naples (fig. 33). At 0600 the TABUK, north of Tunis, had 55-kn northwestwinds, 13-ft seas, and 33-ft swells. The KANE not far away at 38°N, 08°E had 50-kn winds. Other ships were reporting waves up to 25-ft. At 1200 on the 10th the storm was 998-mb over the northern Aegean Sea. The NAPOLEON south of Tbiza had 48-kn north winds. At 0600 they were 60-kn. Late on the 10th this LOW quickly died out and another formed back over the Aegean Sea. There were no more storm-force wind reports. The BANGUI arrived Malta with weather damage to trailers and cargo.

This small storm formed in the sharp trough of a LOW near the Denmark Strait on the 18th. At 0900 it was very near ROMEO with 41-kn southeast winds and 30-ft seas. The GEESTPORT (47°N, 14°W) had southeast 50-kn winds and 20-ft waves. On the 19th ROMEO has 23-ft seas. The tighter gradient on this storm was east of the front Most platforms on the North Sea had strong gales but the SEAGAIR (62°N, 01°E) in the Norwegian Sea had 55-kn south winds and 33-ft seas. The storm moved over Iceland late on the 19th and dissappeared on the 20th. The GEESTBAY and GEIRA were damaged as a result of this storm.

Another quick forming cyclone. It was first found on the 1800 analysis of the 19th, near 50°N, 23°W. It was 990-mb at 0000 on the 20th. ROMEO had 26-ft seas. At 1200 they were 30-ft. The PAVEL KAYKOV (52°N, 17°W) had 58-kn northwest winds with 25-ft seas 10-mb west of the center. The DOCTOR LYKES (47°N, 13°W) had 41-kn winds. On the 21st the BRITISH SPEY (58°N, 02°W) had easterly 55-kn winds and 33-ft seas. Other ships were reporting 40- to 50-kn winds and seas as high as 30-ft. The storm weakened on the 22d but there were still a few swells over 20-ft. It curved southward to die over France.

The tug EDUARD capsized and sank while towing the pontoon GIANT 14 early on the 21st 40-50 mi north-northwest of Ushant in 15- to 20-meter seas. Four of ten crewmembers were rescued.

The southwest U.S. produced this storm on the 25th on the New Mexico-Colorado border. It moved across the Gulf Coast States on the 27th The CARDISSA (26°N, 85°W) had 43-kn southeast winds. The storm was over West Virginia at 1200 on the 28th. On the 29th there were strong winds and high seas off the coast. Buoys 41001, 41002, and 41006 were reporting waves near 25-ft at 0000. The CHERRY VALLEY reported 50-kn south winds and 25-ft seas and swells. Buoys 44003 and 44004 had 20- to 25-ft seas. The PITTSBURG (37°N, 72°W) had 40-kn winds. At 1200 on March 1, the 984-mb storm was over eastern Quebec. There were no more winds avove gale strength as it broke into multiple centers on the 2d.

Casulaties--Fog was the culprit in these collisions: MACCA and COPACABANA at Hook of Holland, PATTREE grounded in a river near Mistley, CAMILLA WESTON and LARISSASEE on the 15th off England, GERINA grounded in the Delaware River.

These ships had ice damage, RADISSON, AL RAHIM and AL FARIS 3.

Heavy weather in the Mediterranean damaged these ships; CHELLI, EVE, FAST TWO, JOHN K., KAPTAN ASLAN, MARY K., SIBI, and WHITE NILE.

These ships reported damage at unspecified times and/or places; APOLLONIA, ARISTAGELOS ARAVA, AYUBIA, AZUR MED, BENAVON, CHRISTOS K., ENRICO DANDOLO, ESMERALDA I, EVERI, FELICA, IL KENNIES, MARIA DORMIO, OMEGA LADY, ORAVA, SINNO M.E., VISHVA PRAFULLA.

Other Casualties--The SYROS REEFER grounded at east Falklands in gale-force winds on the 5th. The STASZIC struck the quayside in strong winds at Montevideo.

WEATHER LOG, MARCH 1984--There was a large difference this month between the actual storm tracks and mean pressure pattern and climatology. There were only isolated cyclones east of longitude 30°W. One primary storm track approximated its climatic counterpart, that was from the central Great Plains, across the Great Lakes to Belle Isle and then northward through Davis Strait. A second more diffuse primary storm track was from Cape Hatteras northeastward to near 50°N, 45°W. There were four scattered storms over the Mediterranean during the 3d and early 4th weeks of the month.

The mean pressure pattern for the month was vastly different from the climatic pattern (fig. 34). The pressure centers were weak.

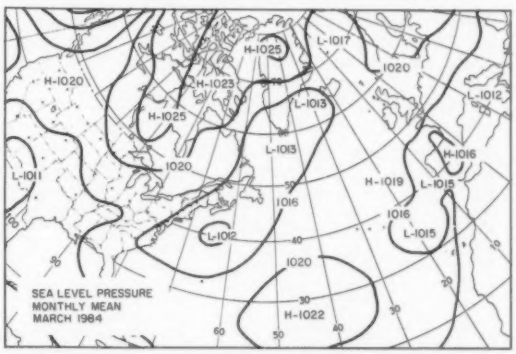


Figure 34.-- Mean monthly sea-level pressure.

There was a large weak cyclonic circulation that stretched northeastward from off the east coast of the United States to Iceland. This enclosed three centers, a 1012-mb east of Long Island, a 1013-mb over the Labrador Sea, and a 1013-mb between Kap Farvel and Keflavik. There was a 1017-mb low center over the Greenland Sea, one over Novaya Zemlya, and another the Arctic Ocean, There were two 1012-mb low centers over the Mediterranean Sea, and two 1015-mb low centers, one over Cape Finisterre and the other at 35°N, 20°W. The counterpart of the Azores High was 1022-mb near 28°N, 44°W, about 600-mi west of its normal location.

The monthly sea-level pressure departure

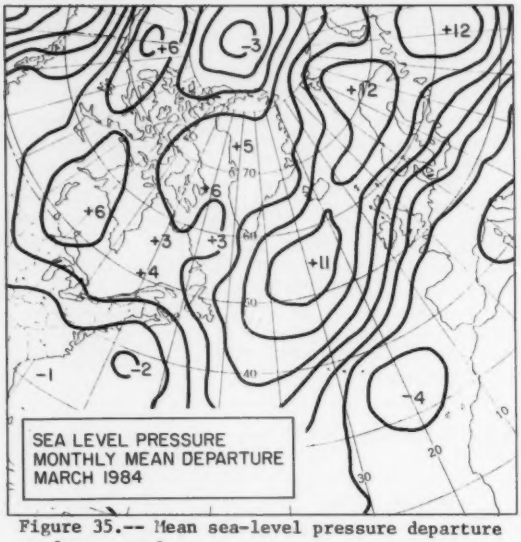


Figure 35.-- Mean sea-level pressure departure from normal.

chart was mainly positive (fig. 35). There was a plus 11-mb center near 53°N, 28°W, a plus 12-mb center near Nordkapp, and a plus 12-mb center over Asia near 57°N, 50°E. The zero isoline stretched across the central United States to Cape Sable then south to 16°N, 60°W, then to 20°N, 30°W, to 35°N, 30°W, to Brest, France to Odessa, Russia. The zero isoline also encircled the North Pole inside latitude 80°N. There were several small negative anomaly areas, minus 3-mb over Sicily, minus 4-mb near 31°N, 20°W, and minus 2-mb east of New Jersey and south of Cape Sable.

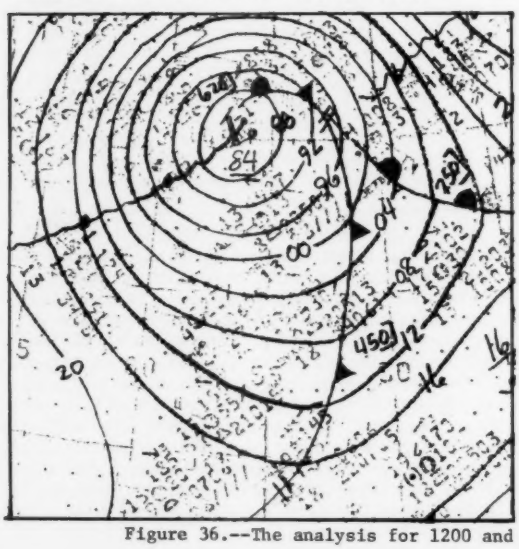
In contrast the upper-air pattern at 700-mb was much nearer normal especially over the eastern United States and western ocean. A LOW was centered over Ellesmere Island with a trough extending over Quebec Province and along the Appalachian Mountains. There was a ridge west of Ireland that stretched southwestward to 30°N, 48°W. The ridge changed to a trough from the Brest Peninsula to west of the Cape Verde Islands. There was another trough from Finland to Libya. The height departures were mainly positive with the anomaly centers closely matching those at sea level.

Some climatology--On the 2d in 1846 a great storm struck Virginia and the Carolinas. It caused half a million dollars damage and on Notts Island, N.C. 50 families and 1,000 cattle were drowned. On the 5th in 1962 a tremendous storm was raging along the Atlantic coast, it caused more than $200 million property damage. Winds along the coast reached 70 mi/hr and raised 40-ft waves. Up to 33 in of snow fell in the mountains of West Virginia.

On the 30th in 1823 a great northeast storm with hurricane-force winds raged from Pennsylvania to Maine, with high tides, trees uprooted, and heavy snow inland.

Extratropical Cyclones--A synopsis of the months weather over the North Atlantic. The month started with three cyclones and two HIGHS. The HIGHS were over the southwest and north-central ocean. A cut-off LOW west of Morocco remained all week. LOWs travelled the northern route of Labrador to Iceland. The end of the week there was a large 1042-mb HIGH over Scotland, a HIGH east of Bermuda, and another LOW becoming cut-off south of the Azores.

The second week the cut-off LOW persisted as did the HIGH over Scotland. A HIGH was stationed betweem Bermuda and the Azores and a LOW over the Labrador Sea. At midweek a strong LOW was over Nova Scotia. The end of this week and the beginning of the third week there was a LOW over Spain, a HIGH over the Norwegian Sea and a LOW over the Davis Strait.



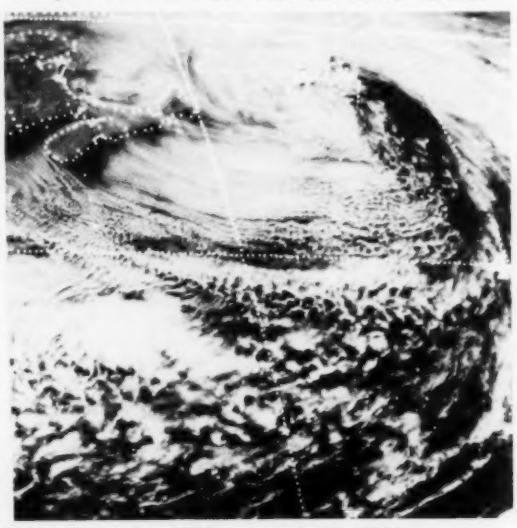


Figure 36.--The analysis for 1200 and satellite image for 1700 on March 10, 1984.

A large HIGH dominated the Gulf of St. Lawrence.

By the middle of the third week there was a HIGH off Newfoundland, another cut-off LOW off Gibralter, plus weak LOWs off the U.S. East coast, Kap Farval, and the Greenland Sea. At the end of the week the cut-off LOW persisted, there was high pressure over Newfoundland, a LOW east of New York, and a deep intense LOW overthe Denmark Strait.

The fourth week produced normal Azores and Bermuda Highs. The Denmark Strait LOW was moving southeastward. There was a large weak LOW over Quebec Province. At the end of the week the Azores High had drifted to midocean and there were weak LOWs between latitudes 35° and 60°N. The end of the month analyses showed a strong LOW off Long Island and another northeast of Cape Race.

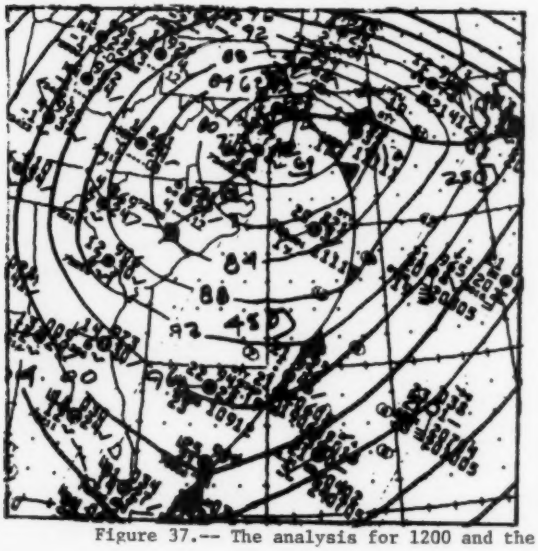
The first significant storm of the month formed south of the Great Lakes on the 8th. As the center moved over the Gulf Stream on the 9th it started deepening rapidly. By 1200 on the 10th it was 984-mb near 45°N, 57°W (fig. 36). There had been a few gales late on the 9th, but on the 10th the number and speeds had increased considerably. The VCNP 44°N, 60°W measured 66-kn northwest winds, but only 13-ft. waves. Only a few miles away a RIGG measured 62-kn winds and 15-ft. waves. The ROBERT E. LEE (41°N, 57°W) had 58-kn winds from 250° and 25-ft swells. On the 11th a Canadian ship (48°N, 52°W) reported 55-kn winds. The FRITHJOF (58°N, 42°W) had 40-kn south winds and 20-ft waves. The storm was over the Labrador Sea and moving northward on the 12th and died out on the 13th.

This LOW was analyzed over the Northwest Territory at 1200 on the 17th. It moved due east, not deviating more than 30 mi from latitude 65°N. Early on the 19th it crossed the Icecap of southern Greenland. At 0600 on the 20th CHARLIE had 58-kn northwest winds and 20-ft seas. At 1200 the winds were down to 45-kn but the seas had increased to 26-ft. At 1800 they were 33-ft and continued into the 21st. The storm was 969-mb near 63°N, 32°W at 1200 on the 20th. On the 21st the ANDES DISCOVERER (52°N, 29°W) had 45-kn west winds and 26-ft waves. At 1200 CHARLIE had 36-ft waves. ROMEO had 45-kn southwest winds and 20-ft seas on the 22d. On the 23d another center formed to the southeast and within 12 hrs had absorbed the old center. At 1200 on the 23d the storm was 960-mb near 58°N, 18°W. The VIGILANT (59°N, 06°W) had 55-kn southeast winds. Platforms in the northern North Sea were reporting winds in the 40's. By 1200 on the 24th the storm had three centers. ROMEO had 47-kn winds and 36-ft seas. LIMA had 49-kn north winds and 21-ft seas. Many platforms now had southeast winds of 40-to-50-kn. At 0000 on the 25th ROMEO measured 40-kn west winds with gigantic 43-ft seas. The CELTIC ENDEAVOUR (47°N, 07°W) had 50-kn winds and 25-ft waves. The CITY OF OPORTO (47°N, 09°W) had 48-kn west winds and 30-ft swells.

The storm moved over England on the 26th and turned north than westward. It disappeared on the 27th.

It appeared these ships suffered weather damage during this storm. The ACADIAN SEARCHER was riding out of the storm about 15 mi east of Aberdeen when she was hit by a 40-ft wave late on the 24th. It smashed windows on the bridge, water knocked out all electrical systems, and poured into the cabins and galley. The crew of the BRANLY abandoned ship 30 mi west of Egersund after developing a heavy list. These vessels also suffered damage: CYPRIOT MARINER, EURO TRAMPER, LUCERO DEL MAR, PENNYDDRAIG, and TRIBUTE.

This storm formed over South Carolina on the 26th. It immediately developed a double center. On the 27th it was southeast of Cape



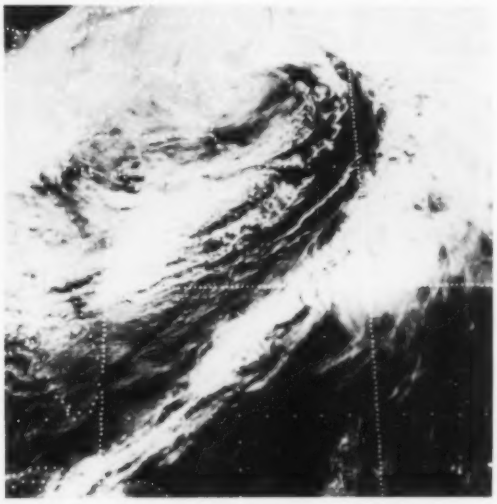


Figure 37.-- The analysis for 1200 and the satellite image for 1500 on March 29, 1984.

Race. The WHZL (47°N, 48°W) had 43-kn east winds. At 1200 on the 28th the two centers were 970 and 972-mb near 48°N, 51°W and 49°N, and 44°W respectively. SEDCO 706 had 50-kn east winds.

On the 29th the storm lost the double LOW. On the 30th a ship near 44°N, 48°W had 45-kn gales and 20-ft seas. The storm was weakening rapidly as another storm approached from the west.

Texas produced this storm on the 27th. By the time it reached the Virginia coast on the 29th it was a large 969-mb storm (fig. 37). There were several 50-kn wind reports. The DART AMERICANA (40°N, 72°W) had 50-kn east winds and 30-ft seas. At 0000 on the 30th the storm was 968-mb off New Jersey. The TOYOTA MARU No.16 (37°N, 69°W) had 61-kn southwest winds, 16-ft seas, and 33-ft swells. The RIGG at 44°N, 59°W measured 63-kn east winds and 20-ft seas. There were many gale reports. The same RIGG had 55-kn on the 31st. The NEW ZEALAND ALLIANCE (43°N, 61°W) had 42-kn north winds and 33-ft seas. A ship at 40°N, 60°W had 30-ft seas.

Another center had formed east of this center and on April 1 it treated LIMA to 40-kn winds, 21-ft seas, and 30-ft swells. On the 2d this LOW was weakening and it disappeared late on the 3d but not before the ROWLOON PEAK (48°N, 27°W) found 50-kn west winds, 20-ft seas, and 33-ft swells.

This storm triggered 22 tornadoes over North and South Carolina during the late afternoon and early evening of the 28th. There were 57 deaths and 1,248 people were injured. Thousands were left homeless and damage was millions of dollars.

The tug BAYOU ANDRIA sank in Lake Pontchartrain late on the 28th in 30-to-40-kn winds and 6- to- 8-ft seas. The EXXON CHESTER returned to New York after sustaining weather damage on the 29th. The SONIA M. left New York on the 28th and sustained damage on the 30th.

The ELDIA (fig. 38) was blown aground and stranded at Nauset Beach, Cape Cod on the 29th. She was abandoned by her crew, some of who later reboarded. The ship was later refloated the middle of May.

Casualties--These vessels had damage from ice; the OCEAN PIONEER in the St.Lawrence, and the AL TURAB and DELTA in the Baltic Sea.

The CLEE and on unknown vessel collided in fog on the 28th, and the RORA HEAD and the KINGSABBEY collided on the 6th off England.

These vessels reported weather damage or problems in the Mediterranean Sea: The ABULWAFA, ANDROMACHE 1 (sank off Libya, all rescued), BANGLAR PROGOTI, BUZURGAN, DIGEST 1, ESSO BREGA, EVGENIA P., GADA, M. HARB, MILOS, QUEEN ELIZABETH 2, RATAN, and SONIA G. MASIQUES (sank south of Barcelona).

These ships reported weather damage: ANEMO K., BARHCHISARAY, BUZURGAN, CONTAINER TRADER, ELGAUCHO, EUROMAN, EVE, GOKOVA 1, HOPECLIPPER,MAUREEN MORAN, PETREL, SEA LORD, SUNTIS, ULTIMA, URLEA, AND WISEMAN.

Other causalties-- The KNALIJ CRYSTAL contacted the POMORZE in Berkeley Sound, Falkland Islands in heavy weather on the 22d. The barge KU-1 capsized in a severe storm, apparently near Montevideo.

Figure 38.-- The 473-ft freighter ELDIA is hard aground at Nauset Beach near Orleans, Mass. The ELDIA was removed from the beach on May 18. WIDE WORLD PHOTO

North Pacific Weather Log
January, February and March 1984

WEATHER LOG, JANUARY 1984--There appeared to be the normal numbers of cyclones this month. The primary path was from east of Tokyo eastward to about 40°N, 180°, thence northeastward to about 45°N, 160°W. At that point some storms continued eastward and some continued to curve northward into the Gulf of Alaska near Kodiak Island. A couple of storms formed south of the Gulf of Alaska and traveled northward. Two storm centers moved over the Bering Sea. These tracks approximated climatology. A climatic primary storm track from east of Honshu into the western Bering Sea was missing.

The Aleutian Low in the mean monthly sea-level pressure pattern was 997-mb and greatly displaced (fig. 39). The climatic Low is 999-mb near 50°N, 170°E. This month it was near 46°N, 176°W. The 1026-mb Pacific High was near 35°N, 133°W, 6-mb higher than normal 300-mi to the north. A 1031-mb High replaced a normal 1021-mb High near Great Salt Lake.

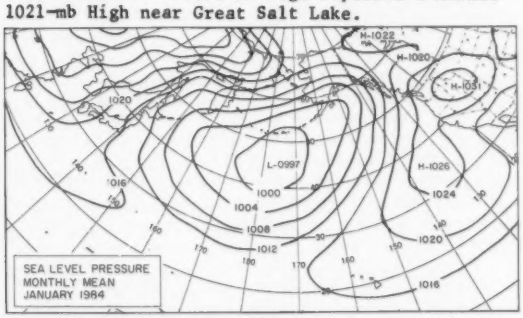


Figure 39.-- Mean monthly sea-level pressure.

There were three major anomaly centers; A minus 8-mb near 38°N, 180°, a plus 10-mb over Great Salt Lake, and a plus 10-mb over the Gulf of Shelikhoro.

The upper air pattern at 700-mb also differed greatly from climatology. There was an anomalous Low at 50°N, 180°, and an anomalous High over Eastern Siberia. A long narrow trough stretched westward from the Low across Sakhalin Island toward where the climatic Low is located. A more intense and more northerly Pacific High produced a sharper ridge over the North American west coast.

There was a negative 88 m anomaly center at 40°N, 180°, a positive 110 m center over Vancouver Island, and a positive 91 m center over the north shore of the Sea of Okhatsk.

There were no tropical cyclones this month.

Some Climatology--On January 29, 1921 a small-intense storm resulted in the great Olympic Blowdown. Hurricane-force winds funneled along the mountains and destroyed 8 billion board feet of timber. At North Head, WA the winds reached 113 mi/hr.

Extratropical Cyclones--During the first week of the month two intense storms crossed the ocean, one into the Gulf of Alaska and the other into the Bering Sea.

The second week the pressure centers were generally small and weak, especially the first part of the week. The end of the week a significant storm moved northward along the Kurile Islands.

The third week found a large storm over the Sea of Okhotsk. The last few days of the week there was a severe storm over the central ocean. There was a strong 1050-mb HIGH north of Kamchatka.

Another strong storm early in the fourth week followed in the heels of the one the last of the third week. There was a large multicentered cyclonic circulation covering the northern ocean. The high pressure center over eastern Siberia retreated into central Asia. The last of the week there was a small intense storm over the Gulf of Alaska. A storm was over the central ocean the last of the month.

Tehuantepecer winds started off the month as a cold HIGH was centered north of Mobile, Al. The Act 11 had 50-kn about 90 mi south of the coast. The B.T. ALASKA also had 50-kn winds from 010° with 15-ft seas and 21-ft swells. The EXXON NORTH SLOPE was about 120 mi south with 35-kn winds, 20-ft seas and 30-ft swells. There were no reports on the 2d.

The first severe cyclone actually had its inception off Honshu on December 30 but it was of no consequence until January 1. The HIRATSUKA MARU (32°N, 153°E) measured 50-kn north winds, 13-ft seas and 25-ft swells. At 1800 the SEA-LAND PATRIOT (36°N, 180°) measured 65-kn winds from 330° and 25-ft swells while about 150 mi southwest of the center. At 0000 on the 2d the strom was 972-mb near 37°N, 173°W. The AMERICA SUN (32°N, 173°W) sent a storm report of 60-kn west winds and 31-ft seas. Several ships had waves over 20-ft. The FALMOUTH BAY 942°N, 155°W) had 50-kn south winds had 26-ft waves.

On the 3d, the EVER SHINE (41°N, 152°W) measured 58-kn southwest winds. The CHEVRON CALIFORNIA (45°N, 152°W) had 45-kn west winds and 30-ft swell. Ships northwest and southwest of the center had waves over 20-ft. At 0000 of the 4th the 960-mb storm was over the Gulf of Alaska near 52°N, 148°W. Several ships had winds near 50-kn and waves 20 to 30 ft. The BOGASARI DUA (47°N, 149°W) measured 51-kn southwest winds and 20-ft waves. The STAR HONG KONG (53°N, 149°W) measured 47-kn northwest winds, 20-ft seas, and 39-ft swells. Buoy 46004 measured 28-ft seas. The HANJIN INCHON reported loosing 26 containers overboard, 6 loose on the deck and 10 damaged on the 4th off Cape Flattery. The WESTWARD VENTURE (57°N, 145°W) had 30-ft seas and 28-ft swells in 45-kn west winds, on the 5th, as the storm neared Yakutat. The storm broke up as it crossed the mountains.

There were again reports of near 52-kn Tehuantepecer winds late on the 4th.

Frontogenesis across Korea into China on the 1st resulted in this LOW and storm. The storm moved eastward and at 0000 of the 4th was 986-mb near 37°N, 149°E. Buoy 21001 (38°N, 145°E) measured 45-kn winds. The EASTERN FRIENDSHIP (37°N, 169°E) measured 50-kn southwest winds. The coaster EISEI MARU dragged anchor in strong winds and ran aground at Sakai Port. At 0000 on the 5th the storm was 952-mb near 43°N, 165°E. There were many high winds and waves. The strongest was 75-kn east winds at 40°N, 170°E by the PACDUKE with 25-ft seas. The SEYLO MARU not far away at 49°N, 167°E measured 53-kn northeast winds with 20-ft seas and 49-ft swells. There were two reports of winds over 60-kn. The OCEAN CROWN (41°N, 173°E) had 46-ft swells out of the south. At 0000 on the 6th the storm was 944-mb near 49°N, 174°E (fig. 40). There were still many winds over 50-kn and waves over 30-ft. The CO-OP EXPRESS 1(52°N, 165°W) had 62-kn south winds. The PRESIDENT WASHINGTON (52°N, 167°E) found 33-ft swells. Waves over 20-ft extended as far south as latitude 35°N.

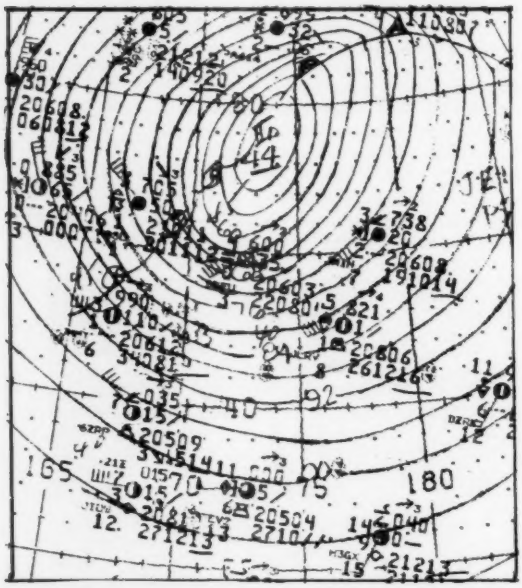


Figure 40.— 0000 analysis January 6, 1984.

The storm crossed into the Bering Sea on the 7th at 960-mb. A frontal wave had moved into the southern quadrant. The EASTERN POLARIS (30°N, 175°W) found 33-ft waves. The storm moved over the EASTERN FRIENDSHIP (38°N, 176°W) about 0600 with 65-kn winds and 17-ft seas. A ship east of the main center had 28-ft swells. The storm quickly deteriorated over the ice and cold water of the Bering Sea.

This was the frontal wave that raced through the southern sector of the storm above. It formed on the 6th near 30°N, 163°E. At 0000 on the 8th the storm was 969-mb near 42°N, 162°W. At 2300 on the 7th the MODE (40°N, 161°W) measured 58-kn westerly winds and 23-ft waves about 100 mi south of the center. The ALASKA MARU (370°N, 170°W) had 34-kn winds and 35-ft waves. Early on the 9th there were three reports of waves of 30-ft south and southwest of the center. Northeast of the storm there were 45- to50-kn winds. On the 9th a second LOW formed north of this one and became the primary LOW on the 10th.

This LOW quickly dissipated but a strong gradient was maintained along the Alaska-British Columbia coast by several week LOWs. The TOWER BRIDGE measured 51-kn winds and 30-ft waves on the 11th. The EXXON HOUSTON measured 57-kn southwest winds and 41-ft swells. On the 12th the HYUNDAI No.22 (54°N, 147°W) measured southeast 48-kn winds and 43-ft waves. The EXXON HOUSTON (51°N, 140°W) measured 45-kn from the southeast and 30-ft waves on the 13th. Later the gradient weakened.

This LOW formed in a trough east of Northern Honshu on the 10th. On the 11th the LIONS GATE BRIDGE south of the center had 45-kn winds. At 0000 on the 12th the 964-mb storm was near 48°N, 158°E. The SEA-LAND FREEDOM (45°N, 156°E) measured 55-kn west winds and 20-ft seas. The CONDORA (29°N, 157°E) claimed 46-ft swells. The STAR HONG KONG reported 30-ft swells and the HIRADO 33-ft swells. On the 13th the SEA-LAND MARINER (45°N, 155°E) measured 50-kn west winds, 20-ft seas, and 26-ft swells. The HIRADO (52°N, 170°E) found 42-kn south winds, 26-ft seas, and 30-ft swells. The storm stalled over the central east coast of Kamchatka on the 14th and dissipated on the 15th.

This storm came out of Manchuria on the 14th. It formed on the eastern edge of a 1052-mb Asian High. It traveled northeastward and was 976-mb over the Sea of Okhotsk on the 16th. The PRESIDENT HOOVER (40°N, 146°E) measured 57-kn west winds, 23-ft seas, and 33-ft swells. The VAN CONQUEROR (44°N, 164°E) measured 56-kn southeast winds. On the 17th the storm was 968-mb at 47°N, 150°E. Again there were many high wind reports. The KAIMON MARU (43°N, 164°E) measured 60-kn southeast winds and 30-ft waves. The ARCTIC TOKYO (53°N, 168°E) measured 55-kn winds from 130°. The storm suddenly weakened on the 18th and was gone on the 19th.

This episode of severe weather was the result of high pressure more than a single low pressure center. As the cyclone described above moved northward over the Sea of Okhotsk a high pressure center developed over the Bering Sea, on the 17th, and moved northward. As the cyclone dissipated several small cyclones formed along the 40° to 45°N latitude belt and the HIGH also elongated east-west. As a result an east-west tight gradient formed between Kamchatka and 150°W longitude that produced high winds and seas. On the 19th the HIGH was 1053-mb near 68°N, 172°E. The FRANCIS SINCERE (53°N, 155°W) measured 52-kn northeast winds. The SHOSHUN MARU (48°N, 169°E) measured only 43-kn northeast winds but the swells were 33-ft from the east.

On the 20th the HIGH was 1054-mb. The LEISE MAERSK (52°N, 168°E) had 40-kn east winds and 33-ft waves. On the 21st the isobars had shifted to a northeast-southwest orientation as one of the LOWs moved toward the Gulf of Alaska. The SHOSHUN MARU now had 40-kn northeast winds and 26-ft waves. A ship at 54°N, 172°W had 58-kn winds. On the 22nd the high was rapidly retreating westward.

The East China Sea produced this frontal wave on the 18th. It travelled east-northeastward and developed rapidly after passing over the Kuroshio Current. The ASIA HUNTER had 50-kn southwest winds south of the center. The PRESIDENT PIERCE (33°N, 170°E) measured 45-kn winds with 20-ft seas. By 1200 on the 21st the LOW was 952-mb near 41°N, 179°E. The CRYSTAL STAR measured 50-kn winds. The EVER SHINE (37°N, 171°E) measured northwest 42-kn winds, 23-ft seas, and 33-ft swells. This was now a large storm. On the 22d its cyclonic circulation stretched from 20° to 60°N and 155°E to 155°W. There were many storm-force or higher winds and waves of 30-ft and higher. The EASTERN MOON (54°N, 180°) measured 60-kn northeast winds and 30-ft waves. The JUTHLANDIA (51°N, 176°E) also had 60-kn winds and 33-ft waves.

On the 23d the storm broke into two centers and was weakening. The FRANCIS SINCERE (51°N, 178°E) still had 56-kn winds but the swell had increased to 39-ft. The SHOSHUN MARU was now at 48°N, 178°E and measuring 44-kn north winds and also 39-ft swells. There were still many high sea and swell reports even though the winds had decreased. The original LOW disappeared on the 24th.

A col area south of Shikoka produced this cyclone. It tracked northeastward and on the 23d was 986-mb east of northern Honshu. The KALIMANTAN IBU dragged anchor off Kashima, Japan and grounded. Twenty-two crewmembers were rescued with one missing. The EVER SHINE AND YAMASHIN MARU were within 30 mi of each other, near 35°N, 147°E, and reported 50-and 48-kn winds respectively. The big difference was in the waves. The former reported 30-ft seas and 35-ft swells while the later had 17-ft seas and 25-ft swells. The 0000 chart of the 24th indicated a double LOW. Several ships reported 50-kn winds or higher. The AMERICAN AQUARIUS (32°N, 164°E) was one of them with 17-ft waves. The ATLANTIC CHARITY (30°N, 155°E) had 25-ft waves. On the 25th the western center disappeared and another formed to the northeast. On the 26th the new LOW was becoming the primary storm. The B.T. ALASKA (49°N, 133°W) had only 20-kn winds but 30-ft swells had propagated into the area. The ORIENTAL EXECUTIVE and KOREAN AMETHYST near 53°N, 156°W both had winds over 60-kn. Neither reported waves. The storm was 961-mb south of Valdez at 1200 (fig. 41).

On the 27th there were three low-pressure centers in the cyclonic circulation. The ZIM SAVANNAH had 45-kn southwest winds and 20-ft waves. The KEYSTONE CANYON (51°N, 130°W) had southerly 30-kn winds with 20-ft seas and 36-ft swells. All three centers were gone on the 28th.

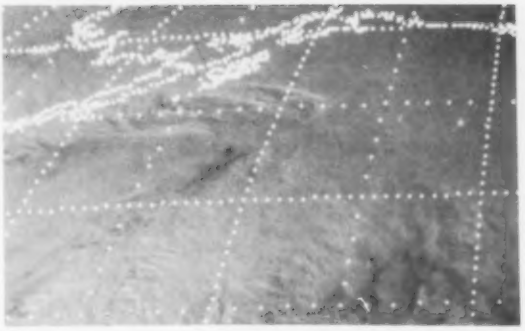


Figure 41.-- The storm was south of Kodiak at 0045 on the 26th. NOAA

This cyclone circulation was found east of Honshu, a favorite area for cyclongenesis, on the 26th. Observations from the TYSON LYKES and the SAMUEL S. helped the analyst locate the new LOW. At 0000 on the 27th two Japanese ships near 28°N, 153°E had winds between 45 and 50-kn with seas of 12 and 26-ft and swells of 30 and 33-ft. The MENINA ALICE (29°N, 168°E) measured 40-kn winds and 33-ft seas and swells. At 0000 on the 28th the storm was 970-mb near 43°N, 177°W. The highest wind was 60-kn from the ZIM SAVANNAH and the highest wave 33-ft by the FORT CALGARY. The THOMAS K (fig. 42) with a cargo of 17,000 tons of scrap iron suffered hull damage in rough seas near 30°N, 148°E and took on sea water. She sank on February 1 off Iro Zaki lighthouse. Eight of 15 crewmembers were rescued. The storm was 964-mb near 53°N, 168°W at 0000 on the 29th. The higher winds were near storm-force. Buoy 46003 measured 26-ft seas. On the 30th the storm was over Bristol Bay and another LOW was moving into the Gulf of Alaska. It was now the more severe. A Soviet ship at 51°N, 177°W reported 49-ft swells. The JAPAN APOLLO (54°N, 142°W) measured 53-kn, 250°, winds and 36-ft waves. The two centers were weakening on the 31st a few 50-kn winds and several reports of swells over 30-ft.

The 29th found another LOW forming east of Tokyo. On the 30th the KOWA MARU (35°N, 156°E) had 45-kn north winds with 33-ft swells. At 0000 on the 31st the storm was 978-mb near 40°N, 177°W. The STAR HONG KONG (39°N, 167°E) measured 45-kn winds with 33-ft waves. The SEA LAND FREEDOM measured 55-kn northwest winds. The storm was over the Gulf of Alaska on February 1, The PRESIDENT WASHINGTON (50°N, 165°W) measured 65-kn north winds with 25-ft seas and 30-ft swells. The KIMI MARU (51°N, 147°W) measured 62-kn southwest winds, 15-ft seas, and 33-ft swells. There were many reports of storm-force winds and waves over 25-ft on the 2d. The INTELLECT (53°N, 153°W) estimated 60-kn west winds with 33-ft seas and swell. The PRESIDENT WASHINGTON now had 55-kn winds from 250° with

Figure 42.-- The THOMAS K. is sinking in rough seas off Shimoda, 140 km southwest of Tokyo, on the 28th. Of the 15 crewmen, 7were rescued, 1 died, and 7 were missing. WIDE WORLD PHOTO

28-ft seas and 38-ft swells. The ATLANTIC WING (53°N, 144°W) measured only 38-kn winds but measured 36-ft seas and 39-ft swells. By the 3d the storm had moved ashore and suddenly imploded.

Casualties--The AMERICAN MARU struck a wharf at Los Angeles in dense fog on the 6th. The LOK PRITI reported weather damage on a voyage from the United States west coast to India. The FLORANI was due Hokkaido on the 11th with weather damage. The EXTRACO 1 encountered heavy weather on the 7th from Manila to Tokyo. Seawater contaminated her fuel. The CISSUS, Kobe for Prince Rupert, alleged heavy weather damage from the 13th to 20th. The SPAN sank in rough weather near 07.5°N, 105°E.

The ferry NASHRA capsized in heavy weather about 700 mi south of Manila on the 23d. at least 34 passengers drowned, about 145 were rescued and an unknown number swam ashore. The SEVEN AMBASSADOR sank 28 km northeast of the tip of Luzon on the 27th in strong winds. Two crewmen died, 13 were rescued and 13 were missing.

Other Casualties-- The NOVO MESTO contacted a breakwater at Portland Australia in gusty winds on the 16th. The IRAN NASR drug anchor in adverse weather at Bandar Khomeini on the 16th and contacted the MAREVEL MARY and AMIN. The UMM CASBAH had heavy weather damage 3d to 5th. The ARYATI had the anchor chain break in high waves in Indonesia and went aground on the 3d.

The icebreaker WESTWIND was holed and partly flooded when she hit an ice shelf in Antarctica south of Chile on the 2d. She sustained a 10-ft gash in her side 6-ft above the water line.

WEATHER LOG, FEBRUARY 1984--There were two distinct favored areas for cyclones this month. One was over the Gulf of Alaska and the other east of the Kurile Islands. There were a few storms that crossed west to east from one area to the other, but not along any concentrated path. The western ocean storms generally formed east of Japan and tracked northeastward to near latitude 50°N where they turned westward and died out. The storms over the Gulf of Alaska formed to the south and southwest over the midlatitudes and tracked north and northeastward into the Gulf and died out over or near the coast. The storms that crossed the Date Line were early and midmonth. There was poor correlation between this months tracks and the primary climatological tracks except in the Gulf of Alaska.

The monthly mean sea-level pressure pattern reflected the two primary cyclone areas with two Lows (fig. 43). One Low was 993-mb over the Gulf of Alaska near 56°N, 150°W. The other Low was 995-mb southeast of Mys Lopatka near 46°N, 162°E. The pacific High was 1024-mb near 32°N, 132°W, with a 1024-mb subcenter over southern Idaho. There was an anomalous 1043-mb High

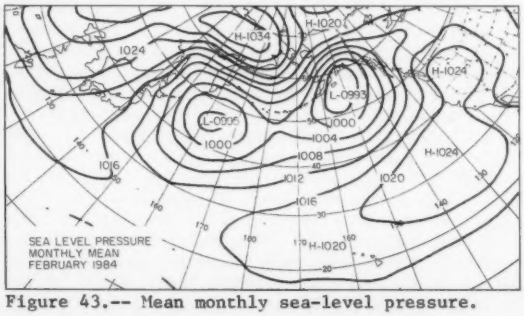


Figure 43.-- Mean monthly sea-level pressure.

over eastern Siberia near 68°N, 150°E.

There were four significant anomaly centers that affected or resulted from the paths the storms took, two minus and two plus. There was a minus 13-mb center near Montague Island in the Gulf of Alaska, and a minus 9-mb center near 56°N, 157°E. The positive anomaly centers were plus 13-mb near 66°N, 170°E and plus 5-mb north of Great Salt Lake.

The upper air circulation at 700-mb reflected climatolology except for an anomalous low over southwest Alaska. The midlatitude flow was mainly zonal except for off the west coast of North America where it ridged over the costal mountains.

There were no tropical cyclones this month.

Some climatology. On the 4th in 1887 San Francisco received 4-in of snow and up to 7in in the hills in western sections. On the 18th in 1899 San Francisco soared to 80°F, a February record for the city. On the 25th in 1922 Los Angeles had a February record of 92°F.

Extratropical Cyclones -- The month started out with multiple pressure centers over the North Pacific. The Pacific High was over the U. S. West Coast. There was also a high presssure cell over eastern Siberia.

The second week the pressure systems were more organized. A large LOW was over the western part of the ocean and a complex cyclonic circulation was over the Gulf of Alaska. At midweek a giant cyclonic circulation covered most of the northern ocean. There was a normal Pacific High. At the end of the week the large cyclone had drifted to the northeastern ocean and a new LOW was east of Japan.

The third week the cycle had returned to multiple weak LOWs from the Gulf of Alaska to Japan with the Pacific High normally located. The last half of the week there were again two strong LOWs with HIGHS over the midlatitude central and eastern ocean area.

The fourth week found a large strong LOW over the Bering Sea with a strong 1037-mb Pacific High. At midweek this had reverted again to small weak centers. The end of the month found these consolidated into two severe cyclones. There was a 1048-mb HIGH over the Bering Strait.

This storm came off Honshu the last day of January. By 1200 on February 1 it was 984-mb near 41°N, 155°E. There were already high winds and waves. At 0000 the SEA JADE at 39°N, 145°E was west of the center with 49-kn north winds and 30-ft waves while the MENINA ALICE (35°N, 150°E) was southeast of the center with 50-kn south winds and 33-ft waves. At 1200 the ORIENTAL SOVEREIGN south of the center measured 61-kn winds from the west. On the 2d the SEA FAN (39°N, 165°E) measured 53-kn west winds with 25-ft seas. The storm weakened on the 3d but the PACDUCHESS (40°N, 170°E) measured 19-kn west winds but the swell was 33-ft. At 0000 on the 4th the 994-mb storm was near 38°N, 165°E. The storm was still weak on the 5th but the BENLEDI (27°N, 161°W) found 45-kn northwest winds, 20-ft seas and 25-ft swells.

After 1200 the storm turned sharply north-northeastward. On the 6th the ZEEBRUGGE (35°N, 155°W) measured 47-kn winds, 30-ft seas and 39-ft swells from the northwest. The LOW went ashore near Yakutat on the 7th and disappeared on the 8th.

This LOW was found over the central ocean on the 1st near 33°N, 170°W. On the 2d the ZIM IBERIA (35°N, 164°W) measured 55-kn winds and the AMERICA MARU (39°N, 162°W measure 47-kn north winds and 25-ft waves. At 0000 on the 3d the storm was 986-mb near 40°N, 155°W. The GREEN MAYA (51°N, 141°W) measured 50-kn south winds. The PACIFIC ANGEL (46°N, 145°W) had 55-kn south winds and 23-ft waves. The storm was over the Gulf of Alaska on the 4th at 980-mb. The PORTLAND (57°N, 149°W) measured 60-kn southwest winds, 33-ft seas and 30-ft swells. The LOW crossed the coast of Alaska about 1200 and weakened rapidly. Early on the 5th the B.T. SAN DIEGO (57°N, 141°W found 30-ft waves.

A LOW quickly developed in the trough of a more northern LOW on the 3d, east of Tokyo. At 0000 on the 4th the storm was 980-mb near 39°N, 162°E. There were many high wind and wave reports this day. By 1200 the storm was 968-mb near 47°N, 163°E and the cyclonic circulation englufed the older LOW west of the Kurile Islands. The ORIENTAL TAIO (37°N, 156°E) had 45-kn northwest winds and 25-ft waves. The LA CONDENSA (34°N, 153°E) measured 40-kn winds with 41-ft seas and 25-ft swells. At 1800 a Soviet ship at 46°N, 152°E measured 71-kn west winds and another at 50°N, 156°E measured 60-kn. At 2200 the STAR DOVER sent a special observation of 80-kn east winds. None of these reported wave heights.

By 0000 on the 5th the storm had absorbed the older LOW and was now 960-mb near 51°N, 155°E. The SAKAIDE MARU (52°N, 166°E)measured 62-kn winds from 110°with 10-ft seas and 39-ft swells. The SETO MARU (53°N, 170°E) also measured 60-kn east winds with 13-ft seas and 30-ft swells. There were many more high winds and waves. By the 6th the storm was weakening and contracting. The AFRICAN HIGHWAY (50°N, 160°E) had southerly 52-kn winds. The storm broke up late that day.

This storm ravaged the seaport of Magadan on the north shore of the Sea of Okhotsk for 4 days. Buildings were damaged and it was reported roofs were damaged and communication poles downed.

The Ryukyu Islands produced this LOW on the 5th. At 0000 on the 7th the storm was 972-mb near 44°N, 159°E. The winds were mostly gales but there were a a few storm-force wind reports. The GALLEON INTEGRITY (41°N, 165°E) found 58-kn southeast winds, 26-ft seas, and 30-ft swells. At 0000 on the 8th the storm was 946-mb near 48°N, 158°E. The SEA-LAND ENDURANCE (42°N, 152°E) had 45-kn west winds and 30-ft seas. At 0600 the winds were 55-kn. The SHINKO MARU (50°N, 175°E) had 55-kn winds from the east with 23-ft swells. Another LOW had now entered

the circulation and was east of the primary LOW. The primary LOW was making a counter-clockwise loop just east of the Kurile Islands.

The trawler TEISHO MARU No. 18 had windows broken in heavy weather near 49°N, 155°E. One crew member was injured.

At 0000 on the 9th the old LOW was 966-mb and the new LOW was 962-mb near 52°N, 175°E. There were many strong gale and higher winds and waves over 20-ft. The 7KBW (54°N, 175°E) had 58-kn east winds. The OCEAN GRACE (53°N, 170°E) had 55-kn northeast winds, 16-ft seas, and 33-ft swells.

On the 10th the new center absorbed the old LOW, the overall cyclonic circulation stretched south to latitude 30°N and east to the Canadian Coast. There were several LOWs and frontal waves imbedded in the overall circulation. Most of the higher winds were now only gales. The HYUNDIA (34°N, 160°E) found 34-ft swells. This LOW was now doing a counterclockwise loop. A ship near the center had 26-ft swells and the BENLEDI (31°N, 169°E) had 36-ft swells. On the 11th one of the frontal waves intensified. The storm continued until the 13th. Its most significant feature now was a few swell wave reports of over 20-ft.

This was one of the frontal waves imbedded in the large cyclonic circulation described above. It developed late on the 9th and was 960-mb by 0000 on the 11th. The ASIA HERON (46°N, 166°W) had 60-kn east winds. A ship nearby reported 20-ft swells. At 0000 on the 12th the storm was 950-mb near 50°N, 153°W (fig. 44). The ORIENTAL TAIO (46°N, 157°W) measured 67-kn west winds, 33-ft sea, and 39-ft swells,300 mi. southwest of the center, The storm was over the Gulf of Alaska on the 13th. The JANJIN POHANG (50°N, 145°W) had 60-kn west winds and 26-ft seas and swells. The PACNOBLE (51°N, 153°W) found 44-kn west winds and 33-ft swells. The storm dissipated on the coastal mountains on the 14th.

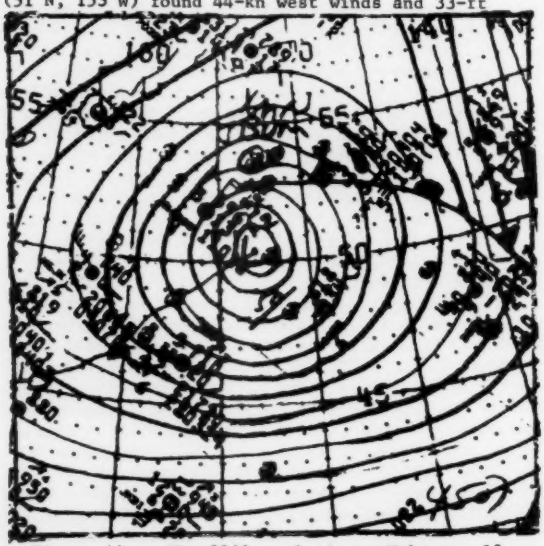


Figure 44.-- The 0000 analysis on February 12.

This LOW developed slightly west of the Date Line on the 16th. The TAO YUAN (37°N, 178°W) had 55-kn west winds 150 mi south of the center on the 17th. At 0000 on the 18th the 972-mb storm was near 44°N, 165°W. The ASIA WINDS (40°N,168°W) had 55-kn west winds and 20-ft waves. On the 19th there was a double LOW. The higher winds and waves were south of the southern center. The AMSTELDIEP (44°N, 154°W) had 54-kn northwest winds and 28-ft waves. The report from the POLAR STAR (54°N, 162°W) read 70-kn winds but the 8-ft seas does not really support that speed although they were in the lee of Unimak Island. The 20th found the storm southwest of Yakutat at 970-mb. The WNBF had 40-kn winds, 13-ft seas, and 30-ft swells. The PACEMPEROR (46°N, 145°W) had 45-kn wind and 33-ft swells.

An East China Sea storm. This was a large strong storm as it moved south of Japan on the 17th. The SAMRAT ASHOK (32°N, 132°E) had winds from the northwest at 52-kn, with 23-ft waves. The TOHOAU MARU (39°N, 158°E) was within 3.5-mb of the center of the storm with 50-kn winds. At 0000 on the 19th the 958-mb storm was at 45°N, 165°E. The ATLANTIC WING (39°N, 170°E) had 50-kn southeast winds, 33-ft seas, and 43-ft swells. On the 20th her seas were 30-ft and swells 36-ft.

This was now a large storm influencing the area between 140°E to 165°W and south to 30°N. There were many gale reports. The U.S. Coast Guard Culter MELLON measured southerly 43-kn winds and 12-ft waves. The storm was 950-mb at 1200. A ship northwest of the center had 50-kn winds. The PRESIDENT GRANT at 45°N, 174°E had 48-kn west winds and 30-ft swells. The STAR MAGNATE (51°N, 167°E) had 45-kn winds with 26-ft seas and 33-ft swells. The NEPTUNE AMBER (51°N, 162°E) had northwesterly 62-kn winds. The U.S. Coast Guard Cutter SEDGE (51°N, 165°W) had 25-ft swells. The storm was filling and beginning to come apart on the 22d. The winds had weakened but there were a few high waves. The storm continued across the southern Bering Sea into Alaska.

The Yellow sea produced this cyclone on the 22d. On the 24th the PACIFIC ANGEL (35°N, 150°E) had 49-kn southwest winds, 15-ft seas, and 25-ft swells. At 0000 on the 25th the storm was 984-mb near 40°N, 160°E. The SANKO HAWK, 150 mi southwest of the center had 33-ft waves. They were 26-ft on the 26th. There were a lot of other high winds and waves. Many of storm force. One of the strongest winds and highest waves was reported by the TOYOTA MARU No. 11 from 45°N, 175°E with 66-kn southeast winds, and 49-ft seas and swells. At 0000 on the 27th the storm was 976-mb at 48°N, 167°E. There were still storm-force winds and waves over 20 ft. A ship within 100 mi of the center had 30-ft seas and 39-ft swells. Another storm was moving northeastward and this one was gone by the 28th.

This storm was born late on the 22d west of the Date Line. At 0000 on the 25th it was 980-mb near 49°N, 157°W. The CLARA MAERSK (43°N, 157°W) found 55-kn west winds. The ORIENTAL PHOENIX (48°N, 132°W)measured 36-kn south winds, 18-ft seas, and 30-ft swells in the eastern edge of the storm. At 0000 of the 26th the storm was 968-mb near 50°N, 151°W. There were many high winds and waves this day. The NEPTUNE JADE (53°N, 138°W) measured 60-kn southeast winds. The CLARA MAERSK now had 30-ft seas. The BARBARA FOSS (57°N, 145°W) had easterly 43-kn winds, 10-ft seas, and 30-ft swells. Buoy 46003 measured 25-ft seas. The MISSION SANTA CLARA (57°N, 141°W) had 45-kn east winds and 33-ft swells. On the 27th the SAMUEL S. (54°N, 169°W) measured 60-kn east winds, 33-ft seas, and 49-ft swells. The HANJIN INCHEON (45°N, 138°W) found 30-ft swells. The storm was now weakening and had turned northwestward. The OVERSEAS JUNEAU (41°N, 125°W) had southerly 25-kn winds with 33-ft swells. It dissipated on the 29th.

This was a short-lived small intense storm that began as a frontal wave west of Portland Oreg. At 0000 on the 14th it was 982-mb off Cape Flattery. The TAI CORN (48°N, 137°W) had 60-kn north winds. Later in the day, the EXXON NEW ORLEANS measured 58-kn northwest winds and 33-ft swells at 43°N, 128°W. On the 25th she had 50-kn winds, 30-ft seas, and 33-ft swells. The storm was now inland. The LA FAYETTE (42°N, 125°W) measured 52-kn north winds and 17-ft waves. Later the storm broke up.

There were Tahuantepec winds on the 28th. At 1200 the CARINTHIA (15°N, 96°W) had 45-kn north-northeast winds, 25-ft seas, and 28-ft swells. The WESTWARD (17°N, 86°W) had 45-kn north winds. These were the only two reports.

Monster of the Month--An inverted trough over Japan produced this LOW late on the 25th. There were already storm-force winds on the 27th. The PRESIDENT HOOVER (34°N, 150°E) had 40-kn south winds with 28-ft. swells. The SKOUBORD (35°N, 153°E) had 52-kn south winds and 20-ft seas. At 0000 on the 28th the storm was 964-mb near 44°N, 155°E. The SHIMA MARU measured 46-kn northwest winds and 20-ft waves near 36°N, 153°E. The GREEN MAYA (38°N, 153°E) had only 35-kn west winds with 31-ft swells. This was a large storm on the 29th at 962-mb. It was near 49°N, 157°E and influenced the ocean north of latitude 30°N, and west of 180° (fig. 45). The GEMINI FRIENDSHIP (51°N, 164°E) had easterly 46-kn winds and 23-ft waves. The OJI GLORIA (42°N, 149°E) measured 45-kn west winds, 33-ft seas, and 36-ft swells. The storm was turning westward which generally indicated a rapid weakening and this was what happened. The storm was 984-mb over the Sea of Okhotsk on March 1 and gone on the 2d.

The SOLANGE P. took on water in high seas near 32°N, 159°E on the 27th and 28th. The TAIYU MARA No. 25 was drifting in the East China Sea in heavy weather and contacted a Korean vessel. The SEA EXPORTER lost two containers overboard during heavy weather from the 28th to March 1.

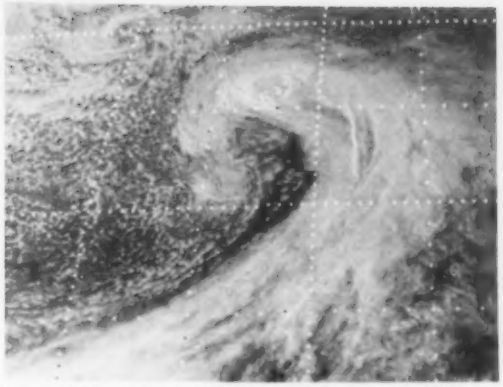


Figure 45.-- The storm as it appeared at 0045 February 29. NOAA

Casualties--The GREEN ELLIOTT had logs shift on the 4th and 5th and diverted to Attu Island, Alaska. The SEA MONARCH contacted the THOR SCAN at Mutsure Anchorage in high winds on the 6th. The QUINTINA sustained damage from force 12 winds. The ARAMIS had heavy weather damage. The STO NINO DE CEBU sank off Suluan Island on the 16th in high waves. The ZUIHO MARU rescued six crewmen. Two Japanese trawlers collided on the 15th north of Atka Island. They were the ANYO MARU No.15 and KYOWA MARU No.11. The KYOWA MARU sank. Only 7 crewmen survived of the 24 aboard.

The THOMAS K. sank in rough seas west of Tokyo on the 1st. Eight survivors were rescued but one later died. The UNITED EFFORT had weather damage in high seas and swells and force 10 to 11 winds. The AL RAZI had weather damage. The BUTE No. 3 broke tow and grounded near Graham Island, British Columbia in fog and gale-force winds on the 29th. The PRESIDENT JEFFERSON lost containers overboard on the 26th.

WEATHER LOG, MARCH 1984--The majority of the storm tracks were enclosed by an envelope of altitude 30° to 40°N off Japan to 35° to 50°N over the central ocean to 45°N to the southern Alaska coast. The most concentrated track was from Tokyo to 41°N, 180° to Valdez. The first half of the month many storms were diverted north and westward by high pressure over Canada.

The monthly mean sea-level pressure pattern featured one large 991-mb LOW near 50°N, 179°W, indicating the average storm was strongest over the central ocean (fig. 46). Climatology indicates two low-pressure centers, one 1005-mb near 50°N, 170°E and a 1007-mb center in the Gulf of Alaska near 55°N, 145°W. The Pacific High was 1024-mb near 30°N, 133°W, about 500-mi east of its normal 1022-mb center. There was an anomalous high-pressure center over eastern Oregon and a 1029-mb center over the Beaufort

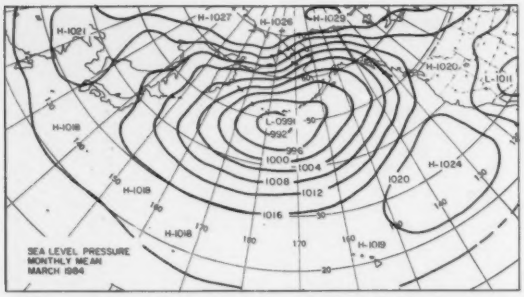


Figure 46.-- Mean monthly sea-level pressure.

Sea, with ridging to the Asian High.

The monthly mean anomaly pattern featured a large minus 18-mb center near 50°N, 175°W. Negative values covered most of the ocean North of latitude 30°N. There was a plus 4-mb center over Idaho, and plus 6-mb centers over the Beaufort Sea and northeastern Siberia.

The 700-mb upper-air pattern was primarily zonal between latitudes 20° and 40°N over the Asian Coast to latitudes 30° and 45°N at 160°W. There the flow turned northeast and northward to the northern North American Coast. There was a sharper than normal ridge over the North American west coast Mountains. The LOW center was near 50°N, 180°, far east of its usual location over the Sea of Okhotsk. This gradient was much tighter than normal, producing higher wind speeds aloft. The normal gradient is 382-m while this month it was 483-m.

There were no tropical cyclones this month.

Some climatology--On the 12th, 1967 a tremendous 4-day storm was raging over California. The storm produced 96-in of snow in 60-hr at Squaw Valley, winds of 90-mi/hr closed mountain passes and heavy rains flooded lowlands. On the 20th in 1948 Juneau, Alaska received 31-in of snow in 24-hr, a record.

Extratropical Cyclones--The month started out with multiple pressure centers over the ocean. By midweek a large cyclone had developed over the northeast part of the ocean. There was a strong HIGH over British Columbia. By the end of the first week the cyclone was moving westward and another passed eastward south of the old center. This new LOW became a signigicant storm. The Pacific High was weak.

The cycle repeated itself the beginning of the second week with multiple low-pressure centers North of latitude 35°N. There were weak high-pressure centers between latitudes 25° and 30°N. At midweek there was a strong HIGH over the Yukon, and a strong LOW off Japan. The LOW was over the central ocean at end of the week. There was a weak Pacific High and other high-pressure centers over the central and western ocean between latitudes 15° and 25°N.

The third week began with a large LOW over the north central ocean and frontal waves along the 30 to 35°N latitude band. At midweek one of the waves developed and moved northeastward to the Gulf of Alaska. The Pacific High was now stronger than normal. Another strong LOW from off Japan turned north and westward about 165°W. The end of the week found another strong LOW east of the Tsugaru Strait.

That LOW moved northeastward the fourth week and at midweek was near 50°N, 180°. A large-strong Pacific High was near 37°N, 140°W, with another HIGH east of Tokyo. There were only three circulations over the water north of 15°N. At the end of the week the pressure centers were breaking down into multiple-weak centers. By the end of the month that process had reversed with several moderate LOWs with one intensifying. The Pacific High was strong at 1039-mb and a 1035-mb HIGH was over the midocean near 35°N, 180°.

The first significant storm of the month began as a frontal wave off Tokyo on the 1st. It traveled east-northeastward and by 0000 on the 3d had developed into a 975-mb LOW near 44°N, 172°W. The HONSHU GLORIA was very near the center at 0600 with a pressure of 970-mb, 38-kn northeast winds, 17-ft seas, and 30-ft swells. The SEA-LAND LIBERATOR (39°N, 172°W) measured 44-kn west winds, 17-ft seas, and 36-ft swells. At 0000 of the 4th, the storm was 968-mb near 43°N, 165°W. The VAN HAWK (54°N, 153°W) measured southerly 50-kn winds and 23-ft waves.

The storm turned northward late on the 4th and northwestward on the 5th. The CHEVRON MISSISSIPPI (58°N, 147°W) had southerly 25-kn winds with 30-ft swells. The PRESIDENT JEFFERSON (37°N, 165°W) had 45-kn northwest winds, 20-ft seas, and 30-ft swells. The PRESIDENT TYLER (49°N, 174°W) had only 10-kn southwest winds but the swells were 30-ft.

The storm started weakening on the 6th as it moved over the Bering Sea. The PRESIDENT WILSON (49°N, 152°W) had 55-kn southeast winds and 21-ft waves. The LOW managed to survive until the 9th.

A frontal wave formed near Tokyo on the 3d. At 1200 on the 5th the LOW was 984-mb near 40°N, 175°E. The RICHMOND BRIDGE (38°N, 171°E) had 50-kn winds. Late on the 5th and on the 6th the storm was passing south of the LOW described above. The PRESIDENT JEFFERSON was in the southeast quadrant with 45-kn south winds and 20-ft waves. At 1800 the CLARA MAERSK reported 44-ft waves near 35°N, 164°W. At first it was believed this was an erroneous report but at 0000 on the 7th she reported 36-ft waves with 60-kn winds. At 0000 on the 7th the storm was 974-mb near 41°N, 156°W. There were several 60-kn wind reports around the storm now. The NEPTUNE DIAMOND measured 60-kn east winds northeast of the center. The TOYOTA MARU No. 24 (38°N, 157°W) measured 56-kn west winds with 30-ft swells.

This storm was now turning northward and then westward as the previous one did. On the 8th the SKOUBORD (34°N, 145°W) had 50-kn west winds and 33-ft seas. The FRANCIS SINCERE No. 6 (33°N, 130°W) measured only 14-kn southwest winds but had 44-ft westerly swells.

The storm weakened quickly but managed to survive a westward track across the frozen northern Bering Sea.

The sea south of Kyushu produced this LOW on the 9th. It quickly absorbed another LOW to the

north and deepened rapidly east of Honshu. At 0000 on the 11th it was 964-mb near 39°N, 149°E. There were many wind reports of storm force or greater on the 11th. The strongest was a measured 78-kn west wind by the LIONS GATE BRIDGE near 37°N, 153°E, but the waves were reported as only 17-ft. The FRIENDSHIP (40°N, 155°E) measured 48-kn southwest winds, 23-ft seas, and 30-ft swells. The LIONS GATE BRIDGE was still reporting 63-kn with 20-ft waves at 0000 on the 7th. The GREAT OCEAN (38°N, 174°E) measured 48-kn west winds. 17-ft seas, and 33-ft swells.

At 0000 on the 13th the storm was 962-mb near 43°N, 178°E. The winds were now mostly less than 50-kn but there were many reports of wave above 25-ft. The MEONIA (41°N, 178°W) had 52-kn southwest winds and 30-ft seas. The storm turned northward late on the 13th but again turned northeastward on the 14th. The BUNGA MELAWIS (43°N, 177°E) had 55-kn winds and 23-ft waves. The PRESIDENT WASHINGTON (49°N, 156°W) measured 48-kn southeast winds, 21-ft seas, and 33-ft swells. The SOVEREIGN VENTURE (29°N, 177°E) far to the south found 33-ft swells on the 15th. The storm died out near Bristol Bay on the 17th.

There were a series of waves on the front south of Japan and paralleling 30°N on the 14th. One of these became unstable and expanded and deepened. It raced eastward at 40-kn and was 976-mb near 37°N, 179°E at 0000 of the 16th. The OCTA (36°N, 180°) measured 65-kn south winds with 20-ft waves. The SEA-LAND ENDURANCE (41°N, 170°W) also measured 65-kn west winds with 25-ft seas, and 39-ft swells at 1800. The NEPTUNE AMBER had 65-kn winds near 44°N, 166°W. The SHINSHO MARU No. 15 capsized and sank near 34°N, 130°E after being struck by a strong wave. All the crew abandoned to a lifeboat and were rescued by the NIKKAI MARU. The SEA-LAND ENDURANCE still had 50-kn west winds, 23-ft seas, and 39-ft swells at 0000 of the 17th (fig.47). The BALLARD (46°N, 153°W) had 58-kn west winds and 23-ft seas at 1800. On the 18th the PRESIDENT TYLER had light winds but found 30-ft swells off northern California. Several other ships had high swells along the Oregon-Washington Coast. The QUEEN OPAL (51°N, 137°W) had 45-kn southwest winds and 39-ft westerly swells. At 0000 on the 19th she reported 43-ft swells from the southwest. The PRESIDENT TYLER (50°N, 136°W) reported 41-ft swells from the west. They were still 38-ft on the 20th as the storm died over the Yukon.

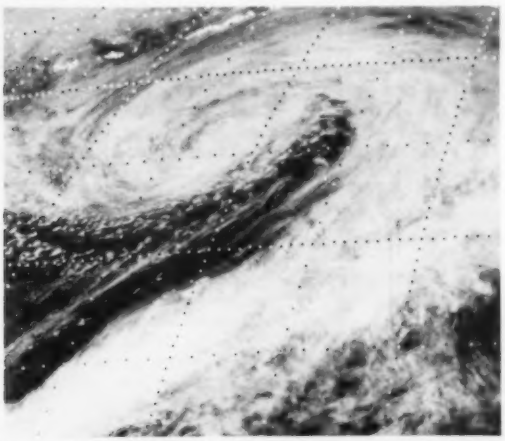


Figure 47.-- The storm at 0000 on the 17th. NOAA

A frontal wave over the Ryukyu Islands on the 15th produced this storm. It traveled northeastward, gradually deepening. On the 18th the storm was 990-mb near 40°N, 158°E. The DAIHO MARU (38°N, 150°E) had 45-kn winds, 15-ft seas, and 26-ft swells. The FAIRWAY (41°N, 152°E) measured 42-kn north winds, 17-ft-seas, and 33-ft swells on the 19th. The PIONEER No. 3 (37°N, 157°E) had 40-kn winds and 33-ft swells. The SEA LANTERN (53°N, 173°W) measured 45-kn north winds on the 20th. The STAR MAGNATE (36°N, 170°E) had 32-kn northwest winds, 13-ft seas, and 39-ft swells. The storm was 972-mb near 49°N, 165°W on the 21st. The OCEAN STEELHEAD (54°N, 168°W) measured 47-kn northeast winds and 15-ft seas. The HONSHU GLORIA (54°N, 172°W) found 54-kn northeast winds, 13-ft seas, and 30-ft swells.

The storm started to fall apart on the 22d and was quickly gone.

Monster of the Month--The China Coast south of Shanghai produced this potential storm on the 18th. By 0000 on the 21at the storm was 972-mb near 40°N, 151°E. The SHIN BEISHU MARU (36°N, 147°E) measured 45-kn northwest winds. The PRESIDENT TAYLOR (41°N, 157°E) had 60-kn east winds and 15-ft waves. The FALMOUTH BAY (39°N, 156°E) reported 70-kn southwest winds and 36-ft seas. The FALMOUTH BAY lost 80 containers overboard and 30 damaged near 39°N, 156°E. She sprung a leak and sent an SOS after developing engine trouble. She later was able to proceed under her own power. At 0000 on the 22d the storm was 954-mb near 43°N, 160°E. There were many high wind and wave reports this day. The highest wind submitted by radio or mail to the U.S. National Climatic Data Center appeared to be 61-kn by the KOREAN SAPPHIRE at 54°N, 154°W. The highest waves were 39-ft by the SEIYO MARU at 38°N, 164°E.

The 1200 chart of the 22d indicated two new centers had formed in the overall circulation. The 0000 analysis of the 23d showed the new one that formed to the east near 42°N, 173°E had become the primary LOW at 960-mb. There were three wind reports over 60-kn but they were suspect because of the low wave values. Most of the reports were strong gale and storm force with waves of 20- to 30-ft. The ATLANTIC (36°N, 141°E) measured 36-ft swells from the northeast. At 0000 of the 24th the storm was 958-mb near 50°N, 180° (fig. 48). It was the only cyclone over the ocean. It was bounded by three strong HIGHs. The GALLEON HONOR (33°N, 177°E) had 30-kn west winds, 25-ft seas, and 41-ft swells. On the 25th the HOEGH MIRANDA had 60-kn winds with a thunderstorm. The storm was rapidly weakening as it moved against high pressure over the Beaufort Sea.

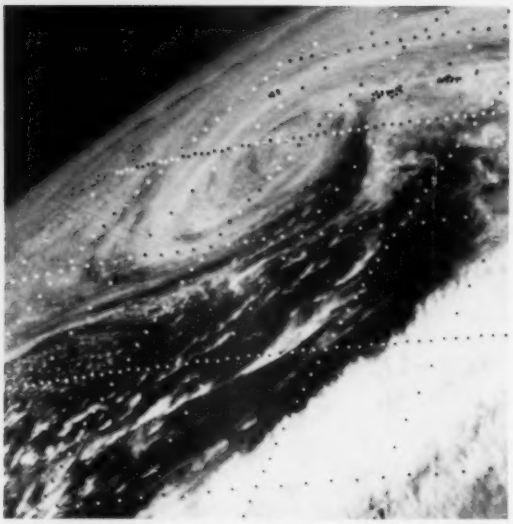


Figure 48.-- This is an oblique view of the storm from NOAA's SMS GOES from 22,000 mi above the Equator. It also proves the Earth is round.

Another storm that formed in the primary cyclogenesis area south of Honshu. By 0000 of the 29th the storm was 984-mb near 38°N, 163°E. At this time it was not yet a large storm. The TAIKO VENTURE (36°N, 161°E) measured 55-kn southwest winds and 21-ft waves. The CLEMENTINA (31°N, 152°E) had 30-kn north winds, 13-ft seas, and 33-ft swells. Twenty-four hours later it was a large storm at 968-mb near 46°N, 173°E. The GOLDEN DAISY (40°N, 175°E) measured 50-kn south winds and 15-ft waves. The VAN HAWK (42°N, 179°E) measured 63-kn west winds, 18-ft seas, and 39-ft swells. The 31st found the 964-mb storm near 51°N, 180°. The SEA-LAND EXPLORER (49°N, 148°W) measured 22-kn east winds, 20-ft seas and 30-ft swells. The CHASTINE MAERSK (54°N, 161°W) had 48-kn south winds and 26-ft waves. On April 1 the storm was over Unimak Pass. The biggest problem now was high swells. The SEA-LAND EXPLORER (46°N, 162°W) found 30-ft swells. There were other reports of near 25-ft. The storm was gone on the 2d.

Casualties--The JANUS JET collided with the MING LEE No. 1 in fog near Macau on the 14th. The same day the YANG ZI JIANG 1 and a wooden fishing vessel collided in fog near Hong Kong. All nine aboard the fishing vessel were rescued.

The KOYO MARU No. 8 capsized near 41°N, 141°E after becoming top heavy from heavy snow. The LANTANA dragged anchor at Kobe in strong winds and contacted a breakwater. The SHINWASAN MARU and APJ PRIYA collided in strong winds at Mutsure on the 21st. The STOLT SHEAF arrived San Francisco with weather damage. The VEGA arrived Chiba with weather damage. The NEPTUNE SAPPHIRE arrived Yokohama with weather damage. The BUNGA RAYA sustained weather damage March 5 to 15.

Other Casualties--Severe storms and gale-force winds hit Port Phillip Bay, Australia on the 26th and 27th. Thirtyone boats were reported sunk, 32 beached, and only 20 left at their moorings. Heavy seas destroyed 50-m of the 200-m Mornington pier. An estimated 75 boats were beached or sunk in nearby areas. At the same time the IRON PRINCE had cargo shift and listed.

The MANILA ENTERPRISE called at Cape Town after having weather damage.

Hurricane Alley

Dick DeAngelis
National Environmental Satellite,
Data and Information Service
Washington, D.C.

The tropical cyclone tracks (fig. 49) and summaries are based on information furnished by several organizations. Unfortunately some of the track are based upon warning positions since no final data were available. The help was kindly provided by Ted Tsui of the Naval Environmental Prediction Research Facility, the Joint Typhoon Warning Center, the Fiji Meteorological Service and our own satellite service. Table 9 summarizes activity for the 3-mo period. Table 10 lists the tropical cyclones that have occurred so far during 1984.

TROPICAL CYCLONES--JANUARY 1984

In an average season about seven tropical cyclones develop, three or four of which become hurricanes. This season was slightly below average with five tropical cyclones three of which reached hurricane intensity. The Australia-South Pacific activity was below normal as they checked in with only one tropical storm and one hurricane. This is below their normal of about four and two respectively. Tim and Grace were the first two of the year. Tropical storm Tim developed on the western side of Australia. He never was able to intensify fully because of unfavorable conditions in the upper atmosphere. His winds reached a peak of 45-kn on the 8th. Off the eastern side of the continent, in the Coral Sea, Grace reached minimal hurricane strength when winds were estimated at 65-kn near her center on the 16th. Early in the day Grace passed close to Marion Reef (WMO 94298) where maximum winds of 55-kn from the north were reported. Less than 24-hr later Frederick Reef (WMO 94393) reported 70-kn sustained winds.

Of the three South Indian tropical cyclones, tropical storm Domoina wreaked the most havoc when she moved across Madagascar on the 22nd and into Mozambique on the 28th. At least 109 people died in the floods which devastated southern Mozambique. Damage is estimated at $75 million. Some 350 thousand farmers lost their crops. The flooding came after years of drought. The irrigation system was badly damaged with more than 50

small dams destroyed and 28 pumping stations out of action.

South Africa and Swaziland were also hard hit. Torrential rains produced the worst flooding in Swaziland's history. Thousands of acreas of crops were under water as more than 33-in. of rain fell in the Pigg's Peak area. In South Africa the northern Natal town of Vryheid reported 20 inches of rain on the 30th. In Swaziland the death toll was last reported at 73; in South Africa it was 61.

While Domoina was devastating the western South Indian Ocean area, Edoara was having a brief fling to the east. She reached tropical storm strength only for a brief time on the 21st and 22d. Vivienne was the only cyclone to reach hurricane intensity in the South Indian Ocean this month. She developed east of the Diego Garcia Islands on the 22d and took a path toward he west--southwest. Her maximum sustained winds reached hurricane force late on the 26th and peaked at 75-kn early the following day.

TROPICAL CYCLONES--FEBRUARY 1984

The Southern Hemisphere was active this month as nine tropical cyclones developed and four of these reached hurrican strength. The average is about six and three. Three of the cyclones formed in the South Indian Ocean area and the rest in the Australia-South Pacific region.

For the second time in 3 weeks the east coast of southern Africa was affected by a tropical storm. This time Imoba formed in the Mozambique Channel on the 12th. While maximum winds only reached 40-kn near her center, which did not move ashore, heavy rains were responsible for death and destruction in South Africa's Natal Province. At least four people died and a temporary railway bridge, built after Domoina, across the Umfolozi River was breached just hours before it was to be opened. Annette and Haja formed around the same time but about 1,200-mi apart. After several days of meandering both headed toward the west-southwest. Haja passed south of the Mascarene Islands and was never more than a minimal tropical storm. Annette reached hurrican strength on the 13th and maintained it until the 20th; maximum winds climbed to 100-kn on the 18th. In Mauritius she was known as Jaminy.

Off northwestern Australia hurricane Bobby and Chloe came to life during the second half of the month. Bobby remained at sea and maintained hurricane strength from the 19th to the 22d. His maximum winds reached 85-kn on the 21st. Chloe came to life in Collier Bay and hugged the coast throughout her brief life. However she reached hurricane strength on the 27th north of Port Headland. Winds climed to 75-kn before she swept inland near Roebourne. Gusts were estimated at near 120-kn and Chloe caused serious damage in both Roebourne and Wickham. There were no reports of injuries.

On the Pacific side of the continent Beti was the only hurricane in February. She moved between the New Hebrides Island and New Caledonia early in the month. For a very brief period early on the 4th winds near her center were estimated at about 65-kn. Tropical storms

Table 9.--Global Tropical cyclone summary
January, February and March 1984

No.	Name	Est. Max Wind (kn)	Basin	Dates
		January 1984		
1.	Tim	45	Aust.-S. Pacific	3-11
2.	Grace	65	Aust.-S. Pacific	12-19
3.	Domoina	55	S. Indian	19-29
4.	Edoara	35	S. Indian	19-23
5.	Vivienne	75	S. Indian	22-30
		February 1984		
1.	Beti	65	Aust.-S. Pacific	2-5
2.	Harvey	60	Aust.-S. Pacific	4-9
3.	Willy	60	Aust.-S. Pacific	5-9
4.	Annette	100	S. Indian	6-23
5.	Haja	35	S. Indian	7-20
6.	Imboa	40	S. Indian	12-16
7.	Bobby	85	Aust.-S. Pacific	16-23
8.	Ingrid	60	Aust.-S. Pacific	20-26
9.	Chloe	75	Aust.-S. Pacific	27-Mar.2
		March 1984		
1.	Jim	50	Aust.-S. Pacific	7-10
2.	Daryl	85	S. Indian	11-17
3.	Cyril	45	Aust.-S. Pacific	16-20
4.	Kathy	75	Aust.-S. Pacific	18-23

Harvey and Willy both attained 60-kn winds over a similar lifetime, Harvey in the Coral Sea and Willy off the other side of the continent. Ingrid developed in the Coral Sea on the 20th. Her maximum winds also reached 60-kn, on the 23d, as she began to recurve back towards the Queensland coast.

TROPICAL CYCLONES--MARCH 1984

March activity was near average as four tropical cyclones developed and two of them became hurricanes. The only South Indian storm was hurricane Daryl whose winds reached 85-kn. He formed just south of Cocos Island on the 11th and was hurricane intensity from the 13th until the 15th. Tropical storm Jim and hurricane Kathy both formed east of the Cape York Peninsula about 10 days apart. Both moved across the Peninsula, across the Gulf of Carpentaria and into the Northern Territory. Kathy's winds climbed to at least 75-kn while in the Gulf while Jim's reached only 50-kn. Kathy crossed the coast in the vicinity of the McArthur River causing destruction to Borroloola township. Wind gusts reached 125-kn in the Sir Edward Pellew Group prior to the destruction of the anemometer. Several Queensland based trawlers were caught in this storm. The KFV LINDERMAN was sund with one crewman lost. The KFV REPULSE, KEV GOLDSMITH, NEWFISH 1, NEWFISH 2, and SOLO 3 were all driven aground in the island group. On the 23d winds up to 150-kn flattened Borroloola, some 435-mi southeast of Darwin. The town's 450 inhaitants huddled safely in the cyclone-proof police station and school while outside 90 percent of the town was being destroyed.

Tropical cyclone Cyril was the first cyclone to affect Fiji after the disastrous hurricanes, Oscar and Sarah, of March 1983. It threatened an area devastated by Oscar, but its wind strength never rose aove gale force intensity, and the gales did not reach any part of Fiji. Its main impact was flooding brought about by prolonged

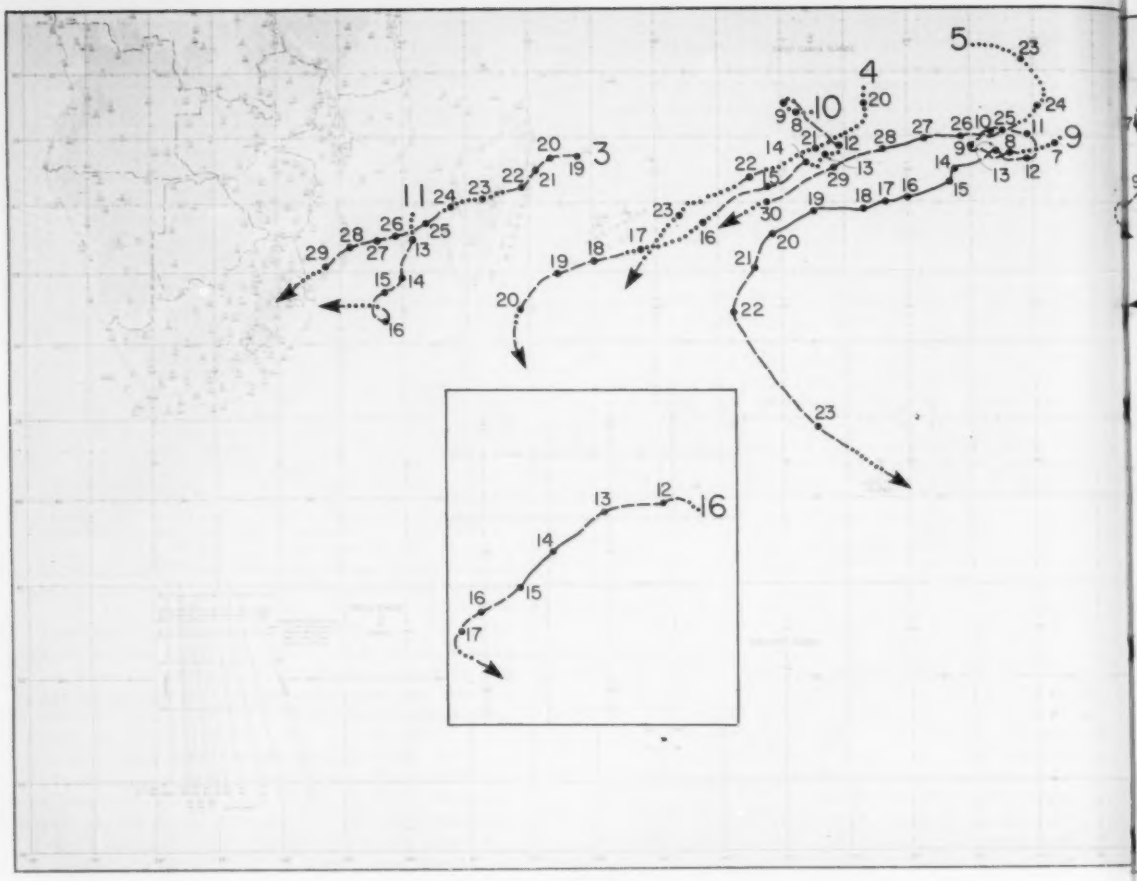


Figure 49.-- Tracks of tropical cyclones, January, February, and March 1984.

spells of heavy rain and minor wind damage caused by the strong and gusty winds, in northern and western areas of Viti Levu and Vanua Levu. Several places received more than 8-in of rain over the 3-day period of 16, 17 and 18 March while Ba, Monasavu, and Koro O received more than 15 in.

By the time Cyril had developed into a tropical cyclone, around midnight Saturday, 17 March (F.S.T.), it was centered about 90-mi to the west of Nadi. The radius of sustained gale force winds about its center seemed to lie just west of the western groups. Western Viti Levu, Kadavu and Vatulele experienced strong and gusty winds for a period on 17, 18 or 19 March.

Cyril did not pass close enough to any reporting station for any precise estimate of the winds near its center. With the help of satellite interpreters in both Guam and Honolulu, Nadi forecasters estimated sustained winds of 45-kn close to the center and over 33-kn within about 60-mi of the center from about midnight (FST) on Saturday 17 March. The estimated wind speed near the center reduced to 40-kn later on Sunday.

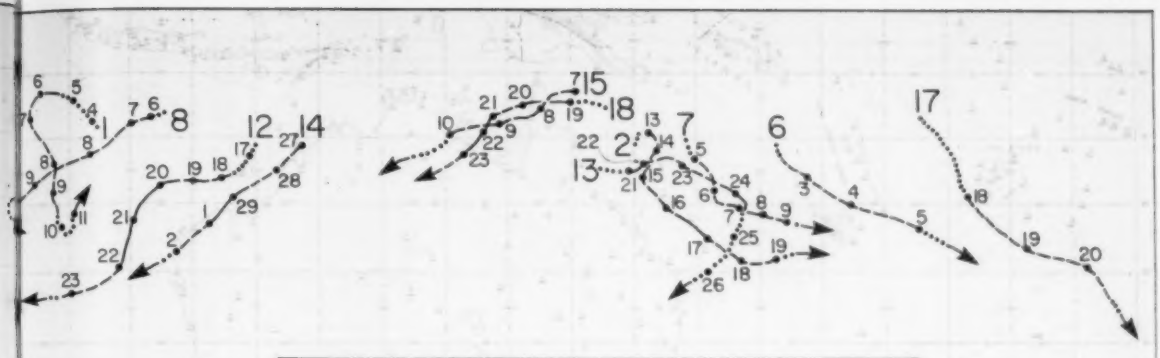
The western parts of Fiji escaped by a narrow margin, but strong (10-min average winds from 22 to 33kn) and gusty winds were experienced in many places. The highest measurements of sustained winds and gusts at weather stations as the cyclone passed were:

Yasawa-i-rara	3 am 17 March	28 kn gust 36 kn
Viwa	6 am 18 March	33 kn gust 38 kn
Nadi Airport	11 am 18 March	26 kn gust 43 kn
Vunisea	3 am 19 March	26 kn
Matuku	6 am 19 March	30 kn
Ono-i-lau	6 am 19 March	33 kn gust 40 kn*

*(average winds possibly over estimated)

The strong and gusty winds caused relatively minor damage. There was significant flooding due to 2 or 3 days with periods of heavy rain in parts of Vanua Levu, many parts of Viti Levu, and in the Yasawa and the Mananuca groups, Vatulele and Kadavu.

As a result of the winds, some sugar cane was either flattened or left with the stalks bent, but in most cases not broken. The most serious damage appeared to occur as a result of the flooding which destroyed some vegetable, rice and root



GLOBAL TROPICAL CYCLONES ORIGINATING JANUARY, FEBRUARY AND MARCH 1984

NO.	NAME	INTENSITY	DATES
1.	TIM	T	JAN. 3-11
2.	GRACE	H	JAN. 12-19
3.	DOMOINA	T	JAN. 19-29
4.	EDOARA	T	JAN. 19-23
5.	VIVIENNE	H	JAN. 22-30
6.	BETI	H	FEB. 2-5
7.	HARVEY	T	FEB. 4-9
8.	WILLY	T	FEB. 5-9
9.	ANNETTE	H	FEB. 6-23
10.	HAJA	T	FEB. 7-20 (Dissipated 9-11)
11.	IMBOA	T	FEB. 12-16
12.	BOBBY	H	FEB. 16-23
13.	INGRID	T	FEB. 20-26
14.	CHLOE	H	FEB. 27-MAR. 2
15.	JIM	T	MAR. 7-10
16.	DARYL	H	MAR. 11-17
17.	CYRIL	T	MAR. 17-20
18.	KATHY	H	MAR. 18-23

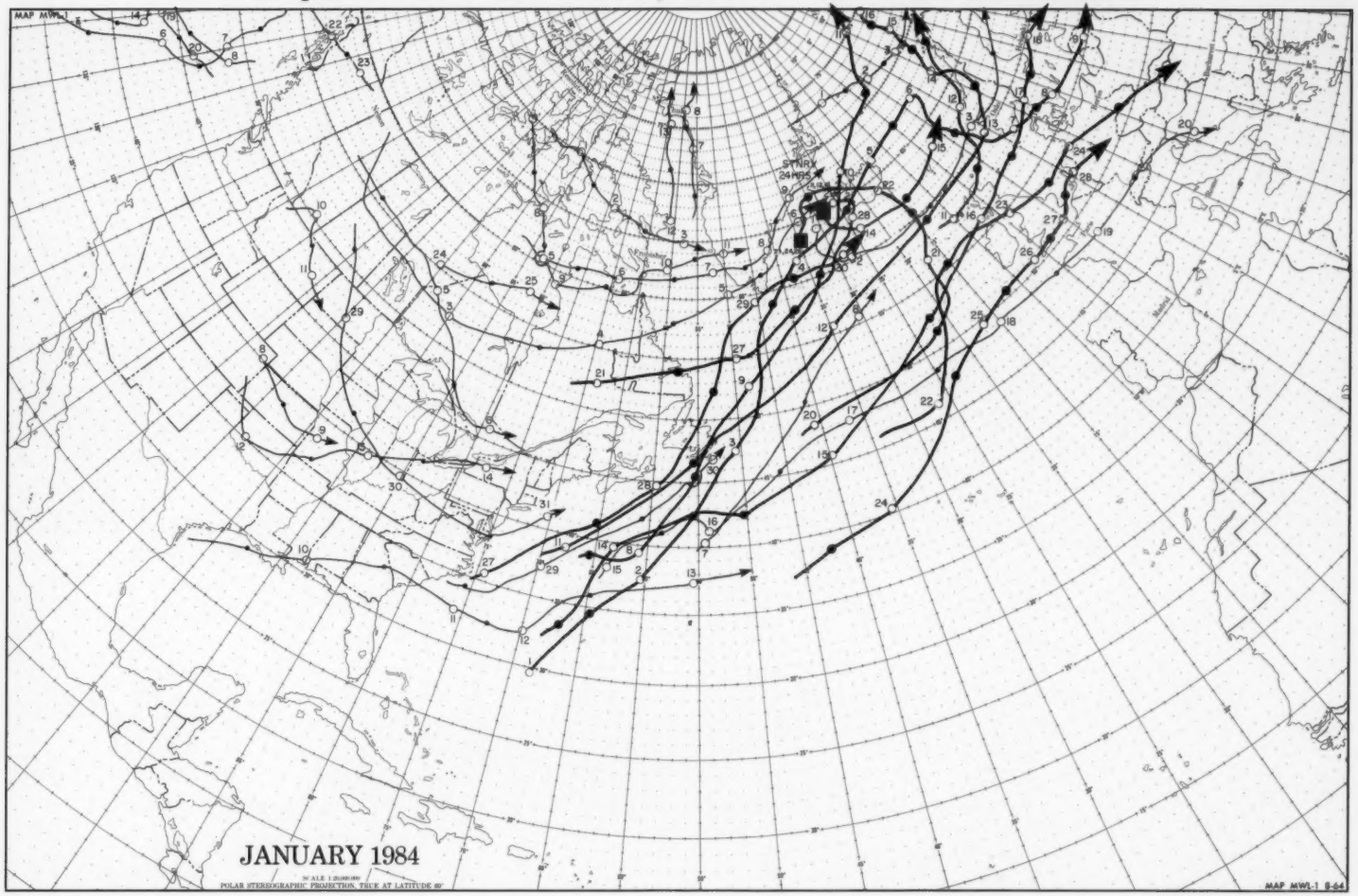
Table 10.--Tropical Cyclone Watch, 1984

Western North Pacific			
Vernon	Td 1W	T	June
Wynne	Td 2W	T	June
Alex	Td 3W	H	July
Betty	Td 4W	T	July
Cary	Td 5W	H	July
Dinah	Td 6W	H	July
Ed	Td 7W	H	July
Freda	TD 8W	T	Aug
Gerald	TD 10W	T	Aug
Holly	TD 11W	H	Aug
Ike	TD 13W	H	Aug
Eastern North Pacific			
Alma	Td 1E	T	May
Boris	Td 2E	H	May
Cristina	Td 3E	H	June
Douglas	Td 4E	H	June
Elida	Td 5E	H	June
Fausto	Td 7E	H	July
Genevieve	Td 8E	H	July
Hernan	Td 10E	T	July
Iselle	TD 11E	H	Aug
Julio	TD 12E	T	Aug
Kenna	TD 13E	T	Aug
Central North Pacific			
Keli	01C	H	Aug
Australian-South Pacific			
Tim	11S	T	Jan.
Grace	12P	H	Jan.
Beti	16P	H	Feb.
Harvey	17P	T	Feb.
Willy	18S	T	Feb.
Bobby	22S	H	Feb.
Ingrid	23P	H	Feb.
Chloe	24S	H	Feb.
Jim	25P	T	Mar.
Cyril	27P	T	Mar.
Kathy	28P	H	Mar.
Lance	29P	T	Apr.
South Indian Ocean			
Domoina	13S	T	Jan.
Edoara	14S	T	Jan.
Vivienne	15S	H	Jan.
Haja	19S	T	Feb.
Annette	20S	H	Feb.
Imboa	21S	T	Feb.
Daryl	26S	H	Mar.
Kamisy	30S	H	Apr.
North Indian Ocean			
--	TC 1A	T	May

crops in low lying areas, and triggered landslides in the interior of Viti Levu. Parts of the Queens Road and Kings Road became impassable to some traffic with water over bridges, adjacent flatlands and dips in the road. The Nadi market, bus stand and shops along Hospital Road and parts of Main Street were under one meter of water for a time.

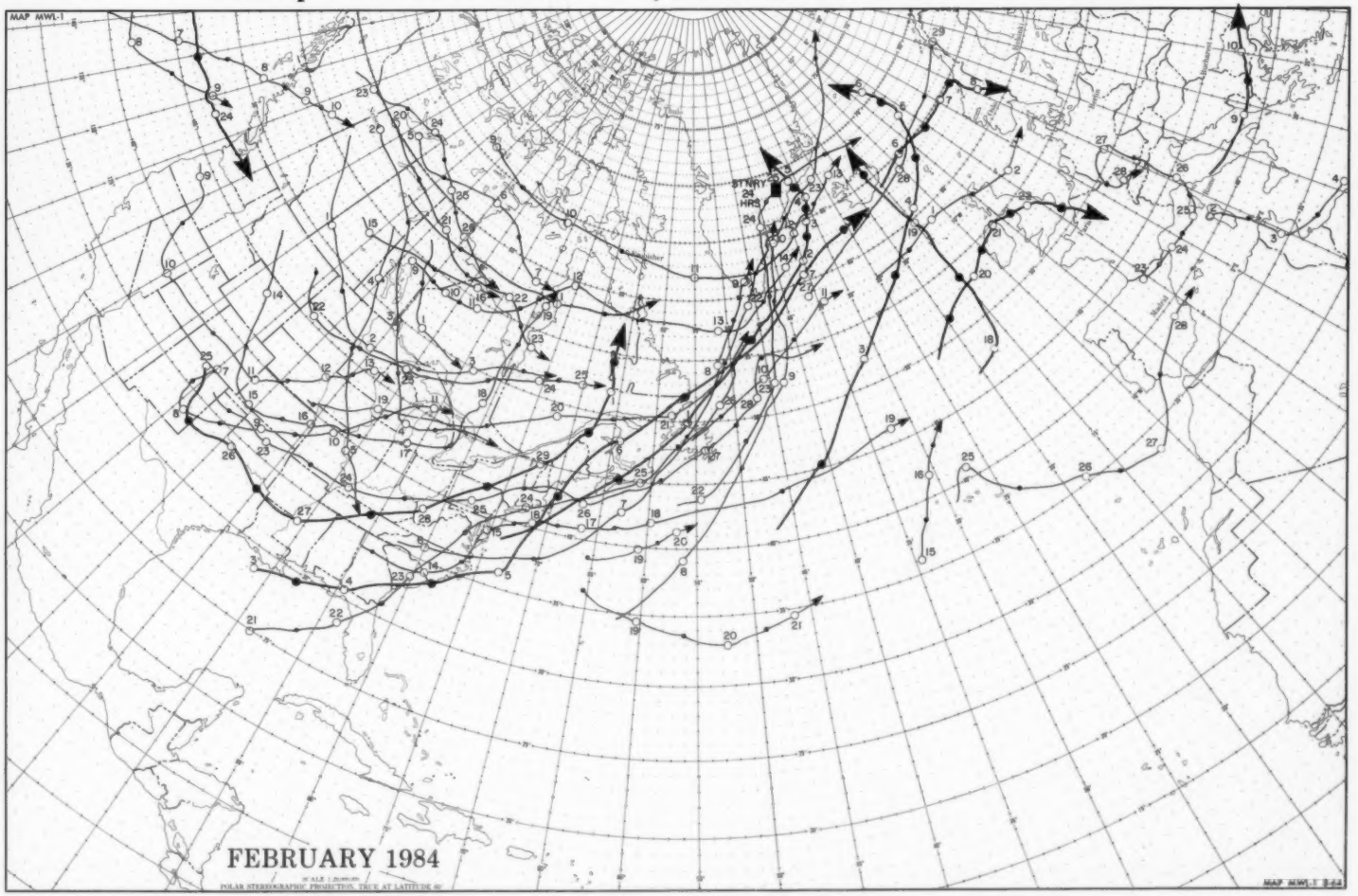
A small storm surge effect was observed in Nadi Bay, with seal level estimated to have been about 0.3m above normal. No damage was reported.

Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



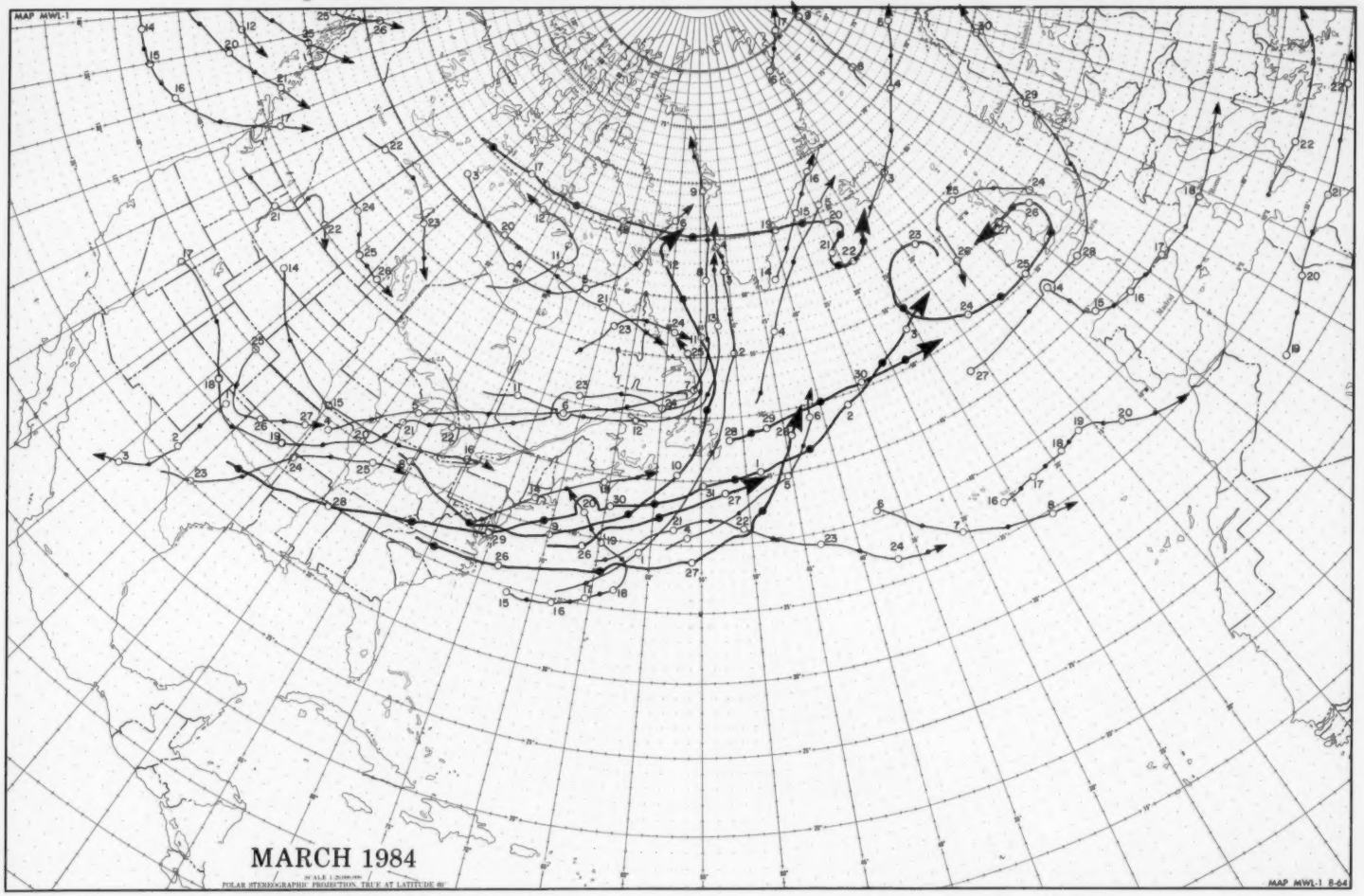
Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



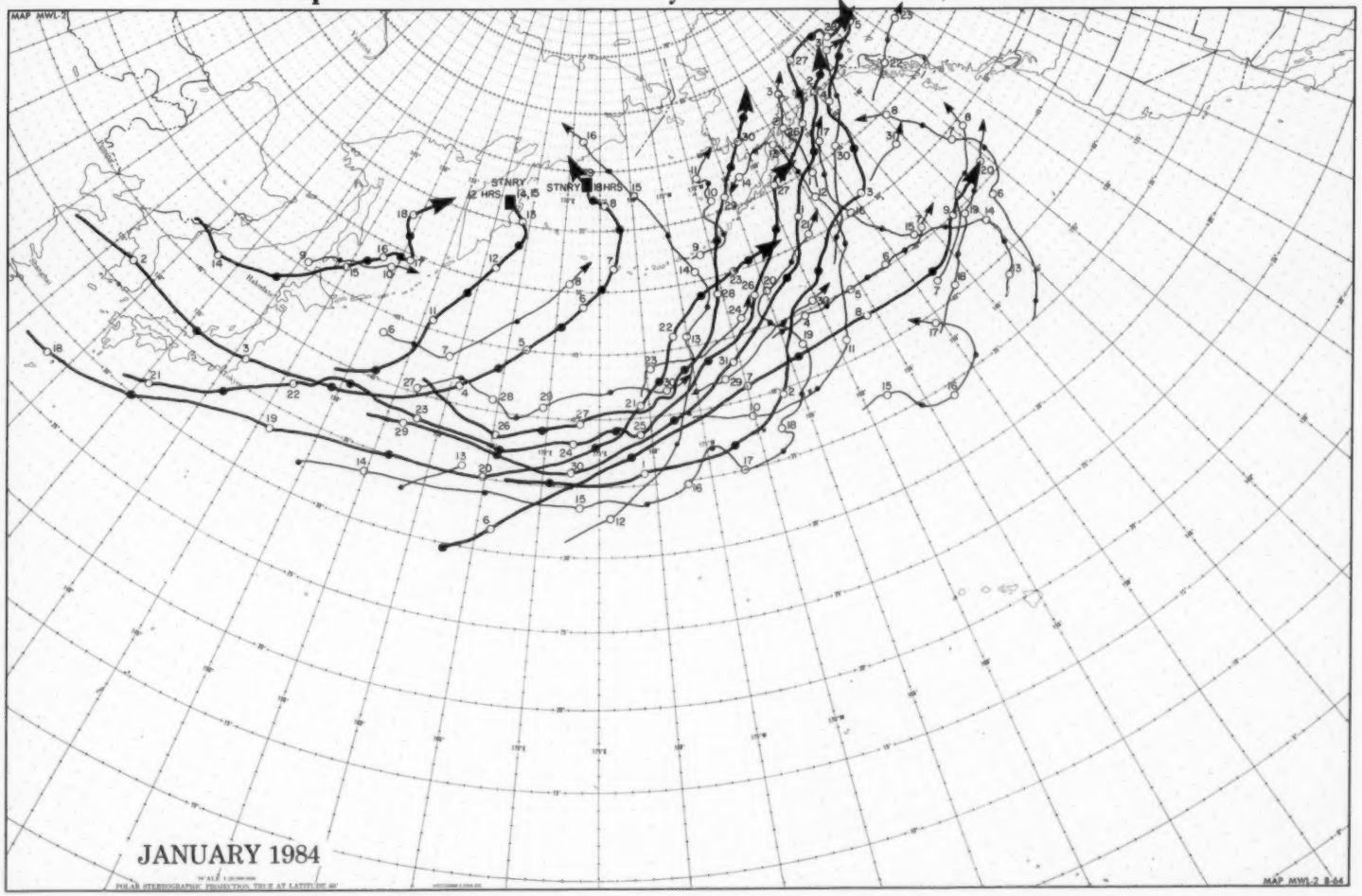
Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



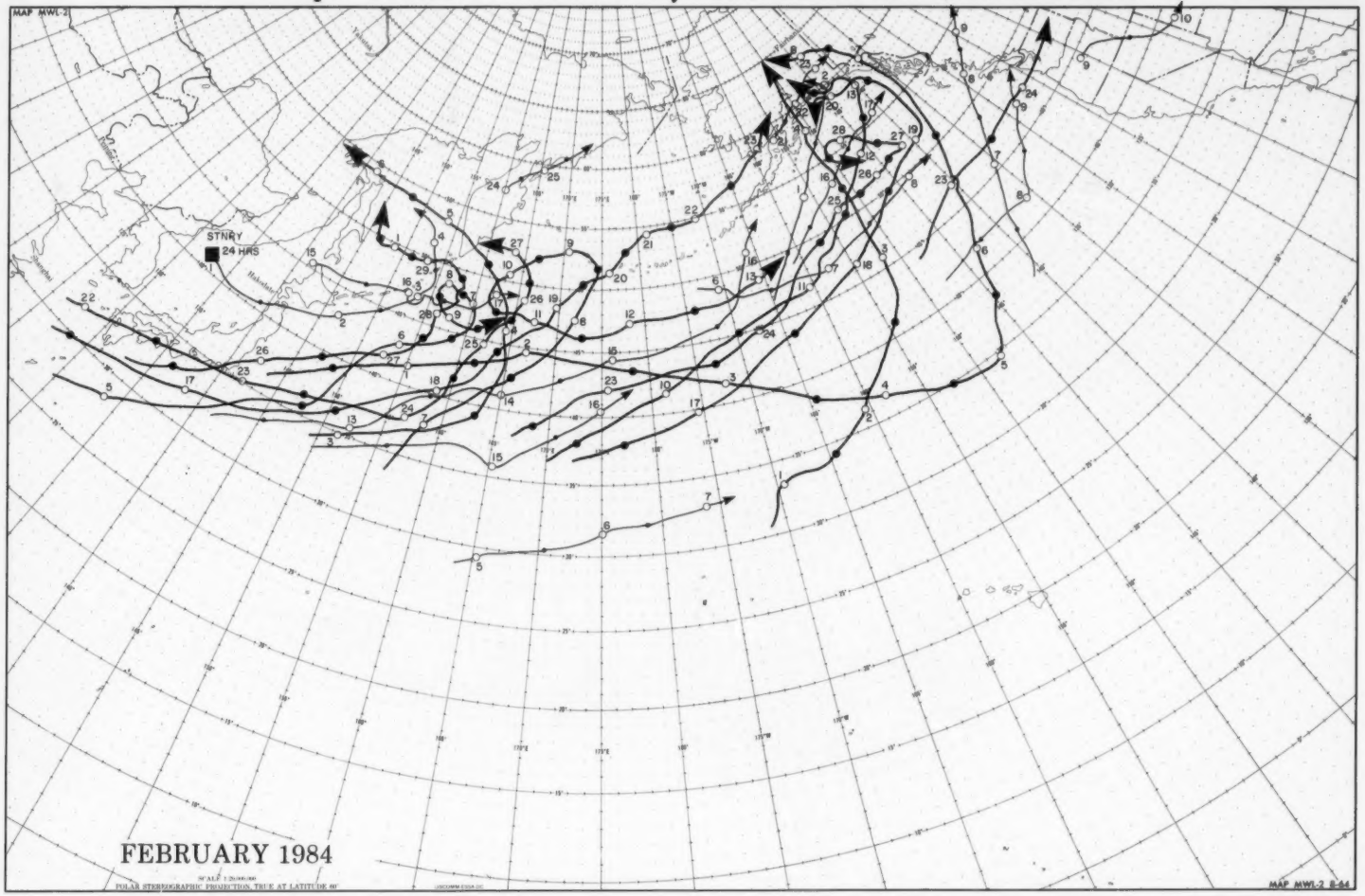
Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



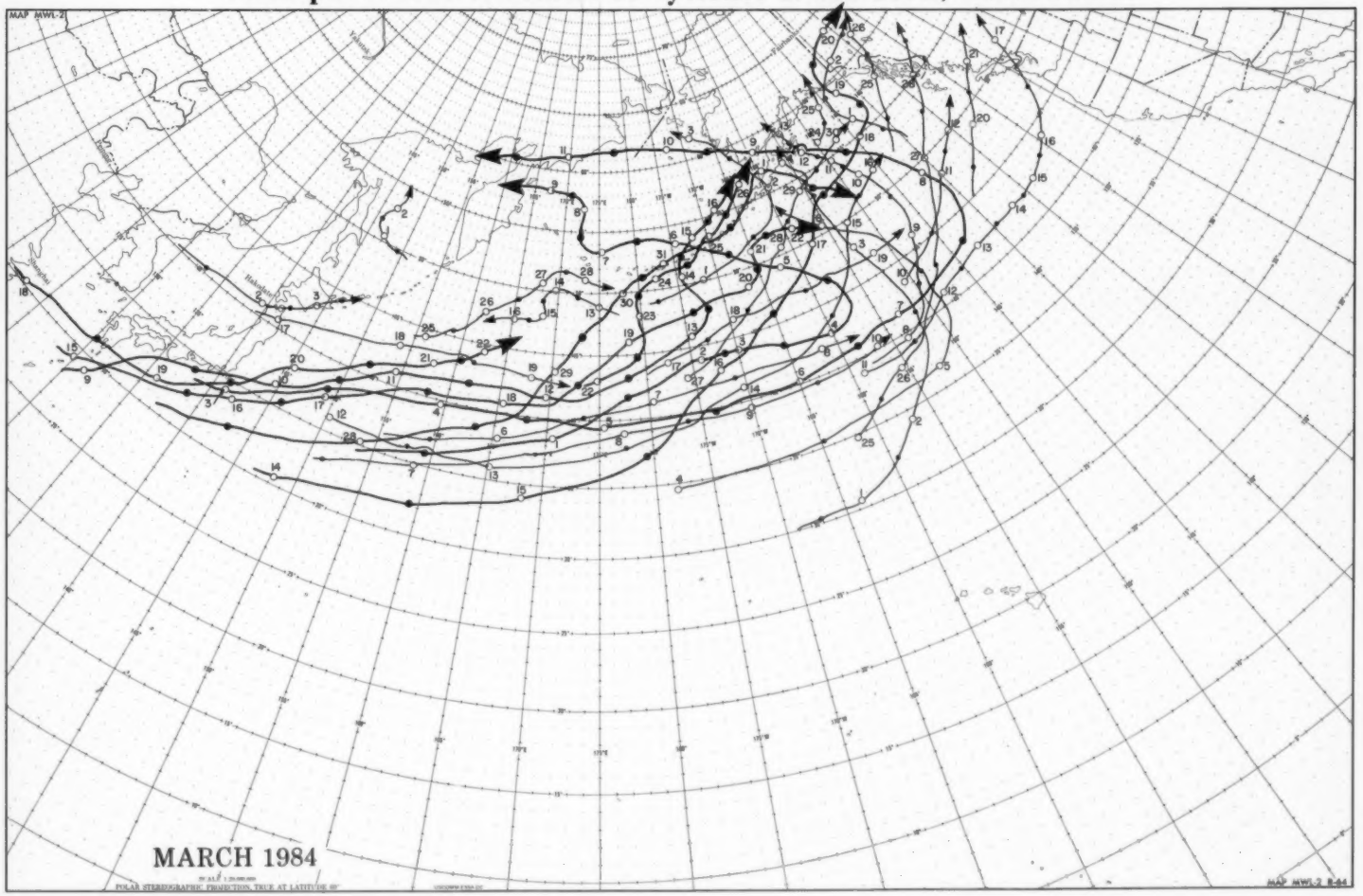
Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with a heavy line are described in the Weather Log.

North Atlantic Selected Gale and Wave Observations

January, February and March 1984

Vessel	Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C Air	Temperature °C Sea	Sea Waves† Period sec.	Sea Waves† Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
	ATLANTIC	JAN.															
SEALAND EXPRESS	MGJD	2	49.0 N	13.8 W	12	23 M	46			1007.2	13.0	13.0	5	11.5	27	5	8
AMERICAN LEGACY	KFGJ	3	47.2 N	11.9 W	12	30	45	5 NM	15	1021.0	11.0	13.9	9	18	30	9	19.5
TFL ENTERPRISE	9VVD	4	54.9 N	70.2 W	00	16 M	50	10 NM		1017.2	15.0	19.1					
MAJAPAHIT	YCTD	5	11.9 N	80.6 W	18	03 M	60	2 NM	60	1016.0	29.0	29.0					
STAR CARRIER	DSMC	7	58.3 N	07.5 W	12	31 M	48			0997.0	7.0		7	24.5	31	8	26
AMERICAN LEGACY	KFGJ	7	44.4 N	49.2 W	18	20	45	200 YD	44	0995.0	9.4	6.1	6	28	20	5	13
SEALAND PACER	MSLB	7	43.4 N	47.0 W	18	18 M	46	1 NM	62	1010.2	16.0	15.0	7	11.5	18	8	13
AUSTRAL PIONEER	MSRL	8	38.2 N	66.7 W	00	30 M	20	10 NM	02	1007.0	14.4	22.2	5	3	16	17	32.5
STAR CARRIER	DSMC	11	48.4 N	26.6 W	00	26 M	48			1018.0	10.0	9.0	15	21	26	15	21
	9VJK	13	35.9 N	69.4 W	00	08 M	48	1 NM	60	1025.0	15.0	21.0	7	10	02	10	14.5
TFL DEMOCRACY	9VPR	13	45.8 N	08.2 W	12	27 M	34	2 NM	16	1021.0	13.0	11.5	16	29.5			
SEALAND INDEPENDENCE	MGJC	15	48.9 N	07.5 W	06	31 M	45	5 NM	13	1011.5	6.0	11.0	5	18	31	7	24.5
SEALAND ADVENTURER	MSLJ	16	48.1 N	11.3 W	12	24	50	2 NM	25	1006.0	13.0	12.0	8	13	24	12	23
AMERICANA	ICPA	19	40.6 N	60.0 W	06	20	45	2 NM	50	1015.5	16.0	15.0	5	8	20	10	13
KEYSTONER	KICR	20	16.1 N	94.8 W	00	36	45			1013.0	23.9	22.8	3	8	36	3	8
	NVOP	23	49.2 N	05.9 W	12	25	45	5 NM	40	0987.1	7.8	11.1	2	18	25	7	19.5
TFL EXPRESS	9VPU	25	48.1 N	20.5 W	12	25 M	60			0985.0	8.0	12.0	11	32.5	25	11	32.5
SEALAND PRODUCER	WJBJ	25	49.2 N	28.2 W	18	30	50	10 NM	15	1021.2	6.7	12.8	13	24.5			
T F L LIBERTY	9VDD	26	42.5 N	52.0 W	06	19 M	48	2 NM	61	1006.0	11.0	3.7					
	ELBU	26	47.4 N	08.4 W	07	20 M	55	5 NM		0986.5	8.5						
SEALAND PRODUCER	WJBJ	26	45.9 N	20.3 W	18	31	45	10 NM	15	1023.8	8.3	10.6	5	8	33	12	16.5
	ELBU	27	46.9 N	09.4 W	00	28 M	45	5 NM	60	1006.0	8.0	11.0	8	10	28	12	19.5
SEALAND PRODUCER	WJBJ	27	46.0 N	17.4 W	00	33	45	10 NM	01	1023.0	8.3	10.6	5	8	32	6	13
SEALAND INDEPENDENCE	WGJC	27	44.7 N	39.6 W	18	27 M	45	10 NM	03	1012.7	12.5	18.3	4	8	27	10	19.5
SEALAND INDEPENDENCE	WGJC	28	45.2 N	33.6 W	06	28 M	46	10 NM	07	1020.0	11.5	16.0	5	14.5	27	8	19.5
	9VJK	28	19.6 N	38.3 W	12	12 M	53	2 NM	62	1017.0	22.0	25.0	7	11.5	12	9	14.5
	9VJK	29	16.8 N	33.5 W	18	07 M	46	5 NM	02	1017.0	25.0	25.0	8	10	10	10	11.5
	9VJK	30	14.6 N	29.6 W	18	07 M	49	5 NM	03	1016.0	23.0	25.0	7	8	08	10	13
	ATLANTIC	FEB.															
	KNCX	1	44.1 N	25.5 W	00	25	50	5 NM	02	1020.0	14.4	12.2	6	10	25	4	6.5
AMERICAN ACCORD	KFEZ	1	47.3 N	18.1 W	06	31	50	5 NM	19	1010.0	8.8	13.4	10	19.5	30	15	29.5
SEALAND PRODUCER	WJBJ	1	48.2 N	08.4 W	12	29	50	10 NM	03	1001.2	10.0	8.3	8	11.5	28	12	19.5
DEFIANCE	KRBS	1	45.1 N	11.5 W	18	32	47	2 NM	81	1020.5	10.0	12.3	7	23	31	8	19.5
SEALAND PRODUCER	WJBJ	2	47.0 N	11.5 W	00	32	50	10 NM	15	1021.1	9.2	9.4	8	13	30	12	24.5
	KNCX	2	43.5 N	35.5 W	18	22	45	5 NM	02	1015.0	16.7	14.4	3	10	22	6	14.5
TFL EXPRESS	9VPU	3	50.3 N	11.6 W	06	30 M	53	2 NM	61	1009.5	12.5	12.5					
	KNCX	3	43.3 N	35.7 W	06	22	48	5 NM	02	1009.0	16.1	14.4	3	10	22	6	14.5
	KNCX	4	43.2 N	37.7 W	00	32	60	5 NM	02	1027.0	7.8	15.0	4	13	32	6	19.5
SEALAND PRODUCER	WJBJ	4	40.4 N	31.4 W	06	32	45	10 NM	01	1028.0	12.2	12.8	8	13	29	12	16.5
TFL EXPRESS	9VPU	5	49.5 N	24.0 W	00	29 M	52	2 NM	25	1027.6	9.5	12.5	14	19.5	28	14	19.5
ARGONAUT	KFDV	5	39.5 N	64.1 W	18	18	45			1000.0	20.0	21.1	5	6.5	18	9	19.5
HOEGH SUN	LIVI	5	42.7 N	59.4 W	18	18	52	.25 NM	99	1010.0	15.0	16.0	14	29.5			
TFL EXPRESS	9VPU	6	45.5 N	31.7 W	06	23 M	47	10 NM	02	1039.8	12.8	14.0					
ARGONAUT	KFDV	6	39.3 N	59.9 W	06	17	50	2 NM	64	1007.8	17.8	20.6	7	14.5	18	10	24.5
AMERICAN ACCORD	KFEZ	6	41.2 N	56.6 W	06	19	50	5 NM	13	1010.5	18.4	19.4					
	KNCX	6	42.7 N	54.1 W	12	32	52	.25 NM	63	1017.0	15.6	11.1	4	13	32	6	14.5
OGDEN DYNACHEM	KNJK	6	33.5 N	77.5 W	12	23	45	10 NM	02	1009.0	10.6	18.8	4	5	23	4	8
DOCTOR LYKES	KHNB	6	49.7 N	12.8 W	18	28	50	5 NM	02	1014.2	11.7	10.6	3	11.5	28	9	29.5
DOCTOR LYKES	KHNB	7	50.0 N	12.7 W	00	28	50	5 NM	02	1010.2	11.7	10.0	3	11.5	28	9	29.5
	WRGO	7	34.2 N	73.3 W	00	27	47	10 NM	02	1007.8	13.3	20.6	6	19.5	27	7	24.5
	KNCX	7	42.0 N	54.7 W	12	19	55	2 NM	59	1011.0	16.7	13.3	4	10	19	6	19.5
CHESAPEAKE	KNFE	7	34.2 N	74.3 W	18	25	58	5 NM	03	1000.1	15.7	21.0	4	6.5	27	8	11.5
	KNCX	8	43.3 N	57.6 W	00	23	55	5 NM		1004.0	1.7	5.6	4	10	21	6	19.5
DOCTOR LYKES	KHNB	8	51.5 N	12.7 W	06	31	48			1017.0	11.4	10.0	3	14.5	31	6	26
	KNCX	9	42.8 N	64.2 W	00	32	45	5 NM	01	1014.0	- 4.4	2.2	2	6.5	32	3	10
MARCONA CONVEYOR	ELDJ	9	30.3 N	80.4 W	12	28 M	45	> 25 NM	02	1022.7	14.0	20.0	3	5	28	3	5
TFL EXPRESS	9VPU	9	43.5 N	59.7 W	18	29 M	45	2 NM	22	1010.5	- 4.0	5.0	8	10			
TFL EXPRESS	9VPU	10	42.9 N	61.5 W	00	31 M	46	2 NM	26	1019.0	- 7.0	11.2					
TFL EXPRESS	9VPU	10	41.1 N	55.6 W	06	14 M	45	2 NM	65	1010.5	15.5	17.5					
AMERICAN PURITAN	KRGB	25	37.4 N	49.5 W	12	17	45	2 NM	58	1014.0	16.7	17.8	6	16.5	17	10	19.5
BORINQUEN	KPCV	28	34.0 N	74.1 W	00	13	45	2 NM	80	1010.0	17.7	23.3	8	8	13	10	14.5
	LDEF	28	45.2 N	35.4 W	18	14 M	45	5 NM	25	0996.5	14.0	15.0	7	16.5	16	12	23
DISCOVERER SEVEN SEAS	3ELE	29	38.4 N	73.2 W	06	25 M	45	10 NM	02	0992.5	6.7	11.5	8	14.5	20	8	14.5
	ATLANTIC	MAR.															
CHERRY VALLEY	WIBK	1	32.5 N	68.6 W	18	28	45	5 NM	02	1010.5	14.4	16.7	5	8	28	10	21
	KWCX	2	42.5 N	28.4 W	12	09	50	10 NM	03	1025.0	13.3	13.9	4	16.5	09	4	16.5
ARGONAUT	KFDV	7	40.6 N	42.4 W	18	28	50	5 NM	01	1009.5	14.4	15.6	7	11.5	28	10	24.5
TRANSCOLUMBIA	KPDG	7	34.3 N	38.2 W	18	31	45	5 NM	15	1013.2	15.6	18.3	6	26	31	8	29.5
DISCOVERER SEVEN SEAS	3ELE	9	38.4 N	73.2 W	12	30 M	47	.25 NM	77	1008.5	- 1.1	10.0	5	16.5	29	5	13
OLLANDER	PJVG	9	36.7 N	72.3 W	18	32	45	1 NM	73	1014.8	0.8	8.8	6	11.5	35	8	14.5
TFL FREEDOM	9VXX	10	36.6 N	57.9 W	00	14 M	45	2 NM	99	1000.5	17.2	19.0					
NORSE MARSHAL	GOZG	10	36.9 N	59.6 W	06	28	45	5 NM	82	1007.4	13.4	17.0	6	6.5	27	5	19.5
ARGONAUT	KFDV	10	40.5 N	63.7 W	06	05	50	2 NM	62	1005.0	5.0	13.3	6	11.5	04	6	23
AMCO VOYAGER	KAOP	10	39.1 N	57.9 W	12	28	45	10 NM	07	1000.8	6.9	22.2	6	8	27	6	29.5
TFL ENTERPRISE	9VVD	23	45.3 N	30.6 W	12	35	47	2 NM	58	1010.5	10.5	13.0	16	24.5	35	16	29.5
TFL ENTERPRISE	9VVD	24	47.1 N	21.3 W	12	29 M	56	.5 NM	10	0995.0	9.5	12.0	14	13	30	24	23
DOLLY TURMAN	WLOD	24	45.4 N	24.5 W	18	32	45	5 NM	18	1009.0	11.1	11.7	11	10	32	11	19.5
USNS RIGEL TAF58	NQSI	25	45.1 N	12.8 W	09	27 M	47	5 NM		0993.0	11.7		9	39	27	9	34.5
WALTER RICE	KCSE	27	45.6 N	27.9 W	18	28	45	5 NM	07	1005.0	8.3	13.8	6	13	28	16	24.5
	NJAX	29	32.1 N	77.5 W	12	27 M	48	5 NM	03	0987.6	18.3	24.4	5	11.5	27	6	14.5
DISCOVERER SEVEN SEAS	3ELE	29	36.4 N	73.2 W	18	23 M	51	2 NM	67		6.1	9.5	5	19.5	23	8	19.5
PIONEER CRUSADER	WHAO	29	32.5 N	73.6 W	18	27	38			0986.5	21.1	21.7	6	16.5	27	9	39
ALASKAN	WTGO	29	30.8 N	76.6 W	18	29	45	5 NM	25	0994.6	23.0	22.8	6	32.5	27	7	32.5
DISCOVERER SEVEN SEAS	3ELE	30	36.4 N	73.2 W	00	32 M	50	5 NM	50	0979.0	4.4	9.5	8	16.5	23	8	14.5
	NJAX	30	34.8 N	74.9 W	03	31 M	55	5 NM	02	0995.0	10.0	23.3	6	14.5	31	9	13
SEALAND ADVENTURER	KSLJ	30	40.2 N	60.5 W	06	26 M	48	5 NM	02	0980.0	18.0	28.0	8	14.5	26	8	14.5
	CSDU	31	35.8 N	51.5 W	18	23 M	48			0990.0	20.0	20.0	3	8	23	6	19.5
D ALBERTIS	IBBD	31	37.1 N	50.8 W	18	25	45	5 NM	03	0996.0	19.5	18.0	9	16.5			

+ Direction of sea waves same as wind
X Direction or period of waves indeterminate
M Measured wind

NOTE: The observations are selected from those with winds ≥ 40 kn or waves ≥ 20 ft from April through September and 45 kn or 30 ft October through March.

North Pacific Selected Gale and Wave Observations

January, February and March 1984

Vessel	Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir. 10°	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C Air	Temperature °C Sea	Sea Waves* Period sec.	Sea Waves* Height ft.	Swell Waves Dir. 10°	Swell Waves Period sec.*	Swell Waves Height ft.
	PACIFIC	JAN.															
	ELOC	1	31.0 N	157.7 E	06	33	M 45			1000.0	17.0	20.0	8	13	30	15	16.5
S T ALASKA	WFQE	1	14.1 N	95.5 W	06	01	50	5 NM	02	1016.0	23.3	25.6	8	16.5	04	11	21
GOKA	YCYE	1	28.2 N	154.9 E	06	27	M 46	10 NM	02	1009.0	18.0	22.0	6	10	27	6	13
EXXON NORTH SLOPE	KHLO	1	13.0 N	96.1 W	08	35	35	5 NM		1014.0	24.4	26.7	10	19.5	01	14	29.5
GALVESTON	KBFA	1	51.6 N	131.6 W	16	18	M 45	2 NM	62	1005.9	8.9	8.3	5	8	18	8	10
SEALAND PATRIOT	KHBF	1	35.8 N	179.6 E	18	33	M 65	5 NM	15	0978.0	17.0	18.0	6	6.5	35	10	24.5
	DJPX	2	54.3 N	164.9 W	00	36	46	2 NM		0980.0	5.0	5.7	4	13	33	10	19.5
WESTWARD VENTURE	KHJB	2	54.3 N	137.0 W	00	17	M 46	2 NM	55	0988.5	6.1	6.7	4	5	17	7	10
AMERICA SUN	WNFJ	2	31.6 N	173.1 W	00	26	M 60	2 NM	05	0989.0	19.0	17.8	6	31	27	7	29.5
	3EXQ2	2	34.5 N	146.6 W	12	20	M 47	200 YD	54	1014.0	18.0		8	16.5	20	10	19.5
	SGCY	2	36.6 N	169.6 W	18	30	M 45	5 NM	07	0990.2	11.2	13.5	8	13			
	SGCY	3	37.2 N	167.3 W	06	30	M 47	10 NM		0992.5	16.5	13.5	8	19.5	09	9	23
	BHFK	3	35.4 N	131.6 W	06	30	M 69	50 YD	44	1030.0	16.0	15.0					
	HPET	3	40.7 N	152.0 W	12	21	M 58	.5 NM	51	0984.0	12.0	10.0					
CHEVRON CALIFORNIA	WCRN	3	40.5 N	151.9 W	18	27	45	2 NM		0974.6	6.7	7.2	4	13	22	10	29.5
STAR COVER	H9AU	4	46.0 N	141.0 W	00	21	48	1 NM	10	0985.0	11.5						
BOABARI CUA	PLYA	4	46.6 N	149.1 W	00	23	M 51	.5 NM	10	0980.7	7.0	7.0	9	18	23	11	19.5
CHARLES LYKES	KLHR	4	40.5 N	151.6 W	06	29	42			0988.0	6.7	2.8	6	13	30	7	29.5
	HUML	4	46.2 N	155.2 E	12	29	M 49	200 YD		0992.0	9.0						
MOHTING ARROW	3EMC	4	35.7 N	167.6 E	18	19	M 45	1 NM		0994.0	16.0	19.0	7	16.5			
SELO ORIENTE	DZFV	4	46.9 N	178.2 W	18	33	22			1018.6	3.0	5.0	5	10	34	34	55.5
EASTERN FRIENDSHIP	MGLR	4	37.3 N	168.8 E	18	23	M 50	.5 NM	81	0992.0	15.0	21.0	3	16.5	23	6	13
	ZCPP	4	53.3 N	148.9 W	18	32	M 47	5 NM	01	0998.5	0.0		12	19.5	32	10	39
KOREAN PRIDE	ELRF	5	36.9 N	166.2 E	00	27	M 56			0993.5	10.0	16.0	7	8	26	11	11.5
SACRAMENTO	H3PR	5	34.6 N	156.5 W	00	30	M 20	5 NM	00	1015.5	13.0	17.0	10	14.5	28	10	31
PHILADELPHIA	WJKD	5	42.3 N	133.6 W	00	25	M 46	5 NM	16	1005.3	7.8	7.2	8	14.5	22	14	28
PACIFIKE	A8SL	5	48.3 N	170.1 E	01	09	M 75	50 YD	97	0972.0	1.0	1.0	11	24.5	09	12	23
GALLEON DIGNITY	DZPG	5	36.0 N	169.0 E	06	27	M 46	5 NM	07	0992.5	15.0	16.0	10	32.5	27	10	32.5
EASTERN FRIENDSHIP	MGLR	5	36.0 N	171.8 E	06	27	M 50	.5 NM	60	0995.0	12.0	21.0	-3	16.5	27	6	13
MAMMOTH FIR	ELPA	5	50.3 N	178.7 E	11	09	M 52	.5 NM	95	0983.5	2.0	5.5	6	14.5	11	6	19.5
OVERSEAS JUNEAU	WWPC	5	56.5 N	143.3 W	12	28	45	10 NM	01	1006.5	2.2	4.4	6	23	27	10	41
PRESIDENT WASHINGTON	WHPN	5	53.1 N	169.0 E	18	06	50	5 NM	27	0984.0	- 0.6	2.8	7	14.5	13	10	26
UNITED SPIRIT	SAMM	6	32.0 N	144.1 E	00	32	M 49	5 NM		1015.5	13.0	20.0	10	23	32	10	23
PACARON	A8YI	6	51.6 N	167.4 E	00	20	M 52			0975.0	0.0	2.0	7	24	02	8	13
HANJIN POMANG	D8QA	6	53.4 N	173.7 E	00	05	M 47	.25 NM	36	0975.0	1.0	5.0	10	26			
PRESIDENT WASHINGTON	WHPN	6	53.3 N	166.0 E	00	03	55	2 NM	22	0989.0	- 1.1	2.8	8	29.5	13	10	23
SELO ORIENTE	DZFV	6	47.9 N	167.3 W	06	16	45	200 YD	07	1005.5	4.0	6.0	3	6.5	16	6	11.5
GALLEON DIGNITY	DZPG	6	37.3 N	177.3 E	06	28	M 46	5 NM	01	1003.0	12.0	16.0	8	24.5	28	8	24.5
ORIENTAL EXECUTIVE	DSAN	6	34.1 N	165.2 E	18	20	M 50	5 NM		1005.0	13.0	23.0					
EASTERN FRIENDSHIP	MGLR	7	38.3 N	175.8 W	06	32	M 65	.25 NM	92	0990.0	13.0	12.0	6	16.5	32	5	13
PRESIDENT GRANT	WE7U	7	41.5 N	155.4 E	12	30	M 52	5 NM	85	1001.0	1.1	15.6	6	24.5	28	6	29.5
	SGAY	7	40.3 N	162.1 W	23	25	M 58	< 50 YD		0980.0	9.0	9.0	6	23	25	13	23
	SGAY	8	40.1 N	155.9 W	23	28	M 45	50 YD	24	1006.0	8.0	10.0	6	23	27	13	23
J T HIGGINS	5LCU	9	36.4 N	147.4 W	06	27	M 35	10 NM	60	1014.0	12.0	16.5	6	29.5			
ARCO SAG RIVER	WLFF	9	40.2 N	148.5 W	06	22	M 28	5 NM	02	0990.0	11.1	12.2	XX	14.5	29	8	29.5
MISSION SANTA CLARA	WKJO	9	37.0 N	166.1 W	12	19	M 46	5 NM	80	1004.0	14.0	11.0					
OVERSEAS JUNEAU	WWPC	9	54.9 N	136.2 W	12	14	45			0994.0	7.2	6.2	4	6.5	14	10	13
THOMPSON PASS	WSFY	9	56.5 N	139.5 W	12	11	50	10 NM		0996.2	7.8	5.5					
SOHIO INTREPID	KACH	9	50.9 N	171.0 W	18	18	45	2 NM		1006.0	10.0						
ARCO FAIRBANKS	WGW8	9	55.1 N	138.0 W	16	09	M 45			0993.8	4.2	9.0	8	13	10	8	13
ORIENTAL EXECUTIVE	DSAN	10	40.2 N	158.7 W	18	15	M 45	10 NM		1008.0	11.0	12.0	9	5			
TOWER BRIDGE	D5NW	11	52.0 N	145.9 W	00	27	M 51	5 NM	07	1005.0	5.5	6.0	10	26	27	13	29.5
EXXON HOUSTON	KHBA	11	56.4 N	141.3 W	06	22	M 57	50 YD	19	0998.0	5.5	6.6	3	8	22	10	41
ASIA HUNTER	5LWE	11	30.3 N	166.5 W	12	23	M 45	2 NM	80	1008.5	19.0	18.0	8	8	25	8	10
PRESIDENT TAYLOR	WJGH	11	36.6 N	141.9 E	12	33	45	10 NM	02	1010.2	5.6	16.7	5	8	33	5	6.5
ORIENTAL EXECUTIVE	DSAN	12	39.8 N	147.5 W	00	15	M 50	2 NM	58	1003.0	13.5	16.0	8	10	18	10	10
SEALAND FREEDOM	WSJU	12	45.4 N	155.9 E	00	27	M 55	50 YD	64	0971.0	1.0	2.0	9	19.5	27	12	19.5
	D9HS	12	53.7 N	147.5 W	06	16	M 48	.5 NM		1000.0	8.0	9.0	8	42.5	16	10	42.5
	ZCPP	12	46.7 N	153.3 E	06	33	M 45	2 NM	85	0980.5	- 1.0		14	23	34	10	29.5
	KGJF	12	49.1 N	157.1 E	12	01	M 48	1 NM	22	0968.2	- 1.0	2.0					
	DYTV	12	44.3 N	176.0 E	12	19	45	10 NM	03	0995.8	9.0		4	16.5			
VAN HAWK	D5ZU	12	51.9 N	144.3 W	18	14	M 50	1 NM	11	1006.5	8.0	3.0	6	11.5	16	9	19.5
ORIENTAL EXECUTIVE	DSAN	13	36.6 N	178.4 W	00	17	55	.5 NM		1015.0	14.5	15.0	12	6.5			
	KGJF	13	45.5 N	155.0 E	00	26	M 50	5 NM	22	0994.6	- 3.0	3.0	8	19.5	28	10	26
EXXON HOUSTON	KHBA	13	51.0 N	140.0 W	00	13	M 45			1017.5	9.1	6.1	5	19.5	15	8	29.5
SEALAND PATRIOT	KHBF	13	52.2 N	142.4 W	00	14	M 45	2 NM	63	1012.9	10.0	4.0	7	16.5	20	8	10
SEALAND DEVELOPER	KHPH	15	36.7 N	174.2 W	00	28	M 43	5 NM	03	1006.5	13.0	13.0	7	8	29	12	32.5
	3EXQ2	15	53.9 N	176.0 W	06	20	M 63	.5 NM	18	0993.0	4.0		10	19.5	20	12	24.5
MAIN EXPRESS	3EFD	15	54.4 N	176.6 W	12	18	M 45			1005.0	2.0	4.0	XX	16.5	20	10	19.5
SEALAND PATRIOT	KHBF	15	54.4 N	176.0 W	12	16	M 50	5 NM	07	1010.1	4.0	1.0	7	16.5	21	9	16.5
ASIA HUNTER	5LWE	15	30.2 N	172.6 E	18	27	M 60	2 NM	80	0997.0	18.0	19.0	6	16.5	30	6	18
ASIA HUNTER	5LWE	16	30.2 N	172.4 E	00	31	M 47			1002.0	19.0	18.0	6	16.5	30	6	18
DRAGOR MAERSK	OVYZ	16	43.5 N	146.5 E	00	26	45	> 25 NM	01	0990.5		2.0			25	6	10
ARCTIC TOKYO	5LJT	16	50.0 N	163.0 E	12	13	M 52			0999.0	1.0	4.0					
UNITED SPIRIT	SMFM	16	36.8 N	162.2 E	12	17	M 55	5 NM		1003.5	14.0	16.5	6	10	17	8	16.5
VAN CONQUEROR	KCAO	16	31.7 N	177.9 E	12	32	50	2 NM	07	0995.6	13.3	18.3	15	23	35	20	29.5
UNITED SPIRIT	A8TE	16	44.0 N	163.9 E	16	14	M 56	2 NM	63	0988.0	3.0	6.0					
SEALAND INNOVATOR	WDKF	17	42.2 N	164.1 E	00	13	M 45	2 NM	81	0995.0	7.0	5.0	9	13	16	10	19.5
ARCTIC TOKYO	5LJT	17	53.1 N	168.0 E	06	13	M 55			1013.0	2.0	3.0					
	KCAO	17	32.0 N	179.5 W	06	32	40	10 NM	07	0996.1	13.3	16.7	15	14.5	34	17	29.5
SEALAND PATRIOT	KHBF	17	50.6 N	165.5 E	06	13	M 50			1004.0	4.0	1.0	9	21	16	14	18
	3EXQ2	17	50.7 N	168.0 E	18	12	M 52	2 NM	07	1010.0	3.0		11	19.5	11	11	24.5
	3EXQ2	18	49.9 N	167.2 E	00	12	M 50	1 NM	62	1006.0	3.0		11	19.5	13	11	24.5
NEPTUNE JADE	S6CT	19	52.1 N	167.9 E	06	09	M 48	1 NM	15	1016.0	4.5						
	3EXQ2	19	45.1 N	157.1 E	12	30	M 47	1 NM	85	0997.0	1.0		10	18	31	11	24.5
VAN CONQUEROR	A8TE	19	47.2 N	173.8 E	18	08	M 46	5 NM	61	0994.0	3.0	5.0					
ASIA HUNTER	5LWE	20	30.5 N	154.8 E	00	23	M 50			1000.0	19.0	19.0	7	10	23	8	10
	DJKX	20	40.6 N	149.8 E	03	06	50	2 NM	23	0996.0	4.0	6.0	6	19.5	05	15	26
LEISE MAERSK	OXDW	20	52.0 N	168.2 E	06	08	40			1018.0	3.0		XX	32.5			

Vessel	Nationality	Date	Position of Ship		Time GMT	Wind		Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C		Sea Waves†		Swell Waves		
			Lat. deg.	Long. deg.		Dir. 10°	Speed kt.				Air	Sea	Period sec.	Height ft.	Dir. 10°	Period sec.*	Height ft.
	PACIFIC	JAN.															
	3FDZ2	20	32.9 N	165.5 E	16	30	M 58	.25 NM	21	0992.0	13.0	10.0					
	LIGL	20	52.5 N	177.2 W	18	05	M 46	2 NM		1009.0	1.5						
PRESIDENT PIERCE	WUBV	20	33.4 N	170.5 E	18	22	45	5 NM		0982.0	13.3	15.6	11	14.5	22	14	19.5
CRYSTAL STAR	DST6	21	34.5 N	179.7 E	06	24	M 50	.25 NM	62	0984.0	14.0	14.0	9	11.5	23	8	13
	WUVB	21	32.9 N	174.3 E	06	24	45	5 NM	02	0993.2	13.3	15.6	11	14.5	24	14	19.5
PRESIDENT PIERCE	WUPV	21	32.3 N	176.3 E	12	28	45	5 NM	25	0997.5	12.8	15.0	11	14.5	24	14	19.5
COSMOS	6ZDN	22	50.1 N	172.3 E	00	02	M 45	2 NM	86	1001.6	2.0	2.0	7	6.5	04	9	16.5
	ELZL2	22	44.0 N	179.9 E	00	01	M 41	.25 NM	44	0967.0	6.0	3.0	10	29.5	12	12	36
	LIGL	22	49.3 N	174.2 E	00	04	M 48	2 NM	86	0993.0							
JUTHLANDIA	ELXV	22	51.2 N	175.6 E	18	05	60	2 NM	61	0999.1	1.8	3.8	12	32.5	03	12	32.5
SEALAND LIBERATOR	KHRP	22	35.5 N	148.5 E	18	27	M 45	10 NM	02	0998.0	12.0	17.0	6	19.5	14	10	19.5
JUTHLANDIA	ELXV	23	51.2 N	173.4 E	00	02	60	2 NM	10	1004.0	3.0	3.6	12	32.5	03	12	32.5
	DDNX	23	40.6 N	150.3 E	06	06	50	2 NM	23	0996.0	6.0	6.0	6	19.5	05	15	26
GALLEON DIGNITY	DZR6	23	51.4 N	173.0 W	06	06	M 40	.25 NM	59	0989.0	4.0	7.0	10	32.5	06	13	32.5
SEALAND LIBERATOR	KHRP	23	36.0 N	153.8 E	06	26	M 50	10 NM	02	0992.5	14.0	15.0	8	19.5	27	10	14.5
ORIENTAL EXECUTIVE	DSAN	23	51.2 N	132.0 W	12	22	M 48	2 NM		1003.0	10.0	10.0					
DIANA	DSJV	23	33.4 N	148.2 E	19	32	M 45	5 NM	02	1011.0	10.0	17.0	8	19.5	34	15	21
	3EPG2	23	31.8 N	155.0 E	23	28	M 47	10 NM		1000.5	14.0	17.0	10	18	30	14	26
	JKMG	24	34.5 N	156.4 E	00	28	M 55	5 NM	02	0993.0	14.5	18.0	5	8	32	6	8
	3EPG2	24	31.7 N	157.2 E	03	17	M 52	5 NM		0996.0	14.0	18.0	10	16.5	31	12	16.5
AMERICAN AQUARIUS	WYR1	24	31.6 N	164.3 E	18	29	50	10 NM	02	0994.3	14.4	17.2	8	10	29	12	16.5
	NJBV	25	34.6 N	139.7 E	12	29	M 45	5 NM		1009.0	6.1	13.9	3	6.5	31	6	14.5
B T ALASKA	WFQE	26	49.5 N	132.7 W	00	25	20	10 NM	01	1024.2	9.4	6.7	5	6.5	28	12	29.5
ORIENTAL EXECUTIVE	DSAN	26	53.8 N	158.7 W	06	33	M 63	2 NM		0973.0	6.0	8.0					
CHEVRON LOUISIANA	WHNG	26	55.6 N	140.3 W	06	19	M 50	5 NM	64	0987.9	7.2		3	10	19	7	14.5
	HPAU	27	29.3 N	168.3 E	06	24	M 40	1 NM	21	0998.0	18.0	20.0	12	32.5	24	12	32.5
	DDNX	27	36.3 N	179.7 W	12	16	55	.5 NM	65	0983.5	12.5	13.0					
KEYSTONE CANYON	KSFK	27	50.7 N	130.5 W	18	20	30	1 NM		1022.0	8.9	9.4	8	19.5	27	14	36
	HPAU	28	29.4 N	165.5 E	00	25	M 26			1005.0	19.0	20.0	10	29.5	28	11	31
PRESIDENT WASHINGTON	WHPN	28	41.2 N	152.8 E	00	34	M 50	5 NM	56	1000.5	1.1	2.2	10	26	02	10	31
KEYSTONE CANYON	KSFK	28	48.4 N	128.2 W	06	20	30	5 NM		1030.0	9.4	9.4	8	19.5	27	14	36
	JERV	29	53.1 N	175.5 W	00	01	M 50	200 YD	56	0980.0	0.5	3.0	10	19.5	04	12	16.5
CHEVRON MISSISSIPPI	WXBR	29	47.4 N	152.2 W	00	18	45	5 NM	02	1012.0	7.5	6.7	3	6.5	18	8	10
PRESIDENT WASHINGTON	WHPN	29	42.0 N	170.3 E	16	05	M 50	5 NM	02	0998.7	2.2	8.3	7	16.5	05	10	29.5
PRINCE OF TOKYO	A8GJ	30	51.5 N	143.0 W	12	21	M 45	.5 NM	52	1002.5	8.0	8.0	6	11.5	21	8	16.5
JAPAN APOLLO	JA7L	30	53.8 N	142.3 W	18	25	M 53	2 NM		0997.0	5.0	9.0	10	36	25	12	36
PORTLAND	WNDF	31	54.3 N	138.4 W	00	22	M 54	5 NM	03	1008.5	5.0	6.1	6	13	23	8	32.5
CHEVRON OREGON	WNNL	31	56.6 N	141.3 W	00	27	M 55			0995.3	5.6		2	13	27	10	19.5
	ZCMP	31	39.2 N	167.5 E	06	03	M 45	1 NM	81	1005.0	4.0		10	32.5	03	10	32.5
	OYIV	31	36.5 N	168.0 E	12	31	45	10 NM	80	1013.2	6.8		4	19.5			
SEALAND FREEDOM	WGJW	31	40.8 N	170.2 W	17	30	M 55	5 NM	80	0989.0	6.5	11.0			32	6	14.5
	3EXQ2	31	41.0 N	170.2 W	18	30	M 53	.5 NM	50	0990.0	7.0		6	11.5	29	7	19.5
	PACIFIC	FEB.															
	HPAU	1	34.4 N	149.9 E	00	18	M 50	< 50 YD	44	1006.0	15.0	21.0	15	32.5	19	15	31
	KLSM	1	51.6 N	170.8 W	00	27	55	2 NM	81	1003.8	8.3	8.3	7	19.5	27	15	29.5
PRESIDENT WASHINGTON	WHRN	1	49.9 N	164.9 W	00	02	M 65	2 NM	73	0976.0	0.0	4.4	8	24.5	04	12	29.5
ORIENTAL SOVEREIGN	ABUH	1	37.9 N	152.0 E	12	27	M 61	1 NM	10	1001.5	9.0	10.5					
SHINKOO MARU	JEUS	1	51.5 N	142.8 W	18	21	M 55			0999.5	8.0	7.5	4	18	21	10	29.5
EXXON NEW ORLEANS	WNDM	1	52.7 N	137.0 W	18	18	M 49	2 NM	81	1006.8	7.2	7.2	3	19.5	19	6	10
SEA FAN	ELCG3	1	38.5 N	159.6 E	23	24	M 54	.5 NM	45	1005.0	8.0	10.0	12	23	26	13	21
	HPAU	2	35.9 N	154.0 E	00	30	M 27			1018.0	12.0	21.0	14	29.5	30	15	32.5
GREEN MAYA	JERV	2	52.3 N	152.9 W	00	25	M 48			0989.5	4.5	5.0	10	14.5	19	12	13
SHINKOO MARU	JEUS	2	51.3 N	143.4 W	00	22	M 50			1005.0	7.5	7.0	8	16.5	23	13	32.5
PRESIDENT WASHINGTON	WHRN	2	51.6 N	151.5 W	00	25	M 55	5 NM	15	0998.7	5.0	5.0	12	28	25	16	37.5
SOHIO INTREPID	KACK	2	55.8 N	139.0 W	12	25	50			1004.2	6.7	8.9	6	29.5	25	6	29.5
	KLSM	2	55.4 N	137.2 W	12	24	55	5 NM	07	1008.8	6.7	6.7	6	19.5	27	12	29.5
SEA FAN	ELCG3	2	38.7 N	164.9 E	17	28	M 53			1012.0	5.0	11.0	10	24.5	28	9	19.5
	DXFU	2	38.3 N	150.7 W	18	16	M 58	.25 NM	82	1001.0	15.0	16.0	7	19.5			
LEXA MAERSK	DXFB	2	39.0 N	151.5 W	18	17	30	< 50 YD	65	1000.0	15.6		8	32.5	14	XX	29.5
CHEVRON MISSISSIPPI	WXBR	2	55.4 N	138.4 W	18	24	45	5 NM	07	1013.8	4.5	5.6	5	14.5	23	8	19.5
SOHIO INTREPID	KACK	3	58.0 N	142.4 W	00	23	45			1006.5	5.5	7.8	6	24	25	6	26
	KLSM	3	56.3 N	139.4 W	00	25	45	5 NM	15	1014.0	5.8	6.1	5	18	27	12	32.5
GREEN MAYA	JERV	3	50.7 N	140.6 W	12	18	M 50			1011.5	7.5	7.0					
PACIFIC ANGEL	3EXQ2	3	45.9 N	145.5 W	18	18	M 55	.5 NM	55	0999.5	11.5		7	18	18	8	23
KYOHO MARU	JJSD	3	49.1 N	149.4 W	18	16	M 46	.25 NM	07	0981.0	7.5	6.0	6	14.5	17	8	16.5
	KGJF	3	51.5 N	148.7 W	18	16	M 46	2 NM	58	0985.0	7.0	6.0	6	16.5	16	8	23
PRESIDENT MONROE	WNRD	4	54.4 N	172.6 W	00	03	45	5 NM	85	1019.0	- 3.9	2.2	3	8	36	8	13
	KGJF	4	51.3 N	142.8 W	09	18	M 45	2 NM	20	1001.5	9.0	7.0	7	11.5			
ORIENTAL SOVEREIGN	ABUH	4	41.9 N	167.5 E	06	15	M 50	1 NM	51	0985.5	9.5	8.0	4	8	16	10	18
NEW INDEPENDENCE	5MOS	4	51.7 N	165.7 E	12	12	M 48	2 NM	10	0998.5	2.5	2.0					
PORTLAND	WNDF	4	56.8 N	148.8 W	12	23	M 60	.5 NM	07	0985.0	4.4	3.3	6	32.5	22	6	29.5
USNS NODAWAY (T-AO67B)	NIRX	4	39.2 N	142.1 E	18	32	45	5 NM		1012.2	0.4	6.7	3	10			
STAR DOVER	H9AU	4	52.8 N	166.6 E	22	11	80	1 NM	69	0994.5	2.0						
SEVEN OCEAN	DZRK	5	46.2 N	151.9 E	00	26	M 45	2 NM	85	0984.0	- 2.0	4.0	8	21	27	20	26
STAR DOVER	H9AU	5	52.9 N	166.7 E	06	13	80	.5 NM	68	0992.0	3.0						
LICA MAERSK	DXPS	5	43.4 N	151.6 E	06	24	48	200 YD	86	0997.8	- 3.5		26	26			
SS B T SAN DIEGO	WSVR	5	57.2 N	141.4 W	06	22	27			1015.4	3.3	4.4	8	29.5	27	8	26
AMERICAN TITAN AK 1008	KPHB	6	37.2 N	150.0 W	00	36	45	2 NM	51	0989.0	15.6	12.2	4	6.5	36	6	16.5
	5LHE	6	38.9 N	138.9 W	03	24	M 48	1 NM		0996.0	13.0						
GALLEON INTEGRITY	DZJG	7	41.5 N	165.0 E	00	15	M 58	.5 NM	81	0984.0	9.0	6.0	10	26	15	14	29.5
	WDZB	7	28.1 N	135.1 E	06	29	M 45	5 NM	23	1013.0	11.0	17.8	XX	8	32	7	16.5
POLAR ALASKA	5LEU	7	47.6 N	159.6 E	12	09	M 50			0960.0	0.0	0.0					
PRINCE OF TOKYO	A8GJ	7	51.4 N	165.0 E	12	09	M 52	200 YD	51	0999.0	1.5	3.0	6	11.5	09	7	14.5
STAR DOVER	H9AU	7	46.3 N	152.5 E	18	32	50	.5 NM	75		0.0						
SOHIO INTREPID	KACK	7	46.0 N	129.1 W	18	17	45	2 NM	50	1006.0	10.6	10.0	6	16.5	17	7	16.5
SEALAND LIBERATOR	KHRP	7	51.3 N	171.7 E	21	11	M 46	2 NM	86	0995.8	0.5	2.0	5	8	10	8	13
POLAR ALASKA	5LEU	8	46.7 N	159.0 E	00	18	M 37			0975.0	- 1.0	0.0	18	16.5	18	16	31
NEW INDEPENDENCE	5MOS	8	43.3 N	148.8 E	00	29	M 46	1 NM	10	0979.0	- 1.5	2.0	13	19.5	29	12	18
STAR DOVER	H9AU	8	44.8 N	150.3 E	06	32	50	.5 NM	73	0970.0	1.5						
SHINKOO MARU	JEUS	8	50.3 N	174.9 E	06	11	M 55	.25 NM	77	0984.5	1.5	3.5	7	13	11	10	23
SEALAND ENDURANCE	KGJX	8	41.9 N	154.9 E	06	27	M 55	5 NM	02	0977.5	1.7	9.0	8	29.5	36	7	8
VAN HAWK	D5ZU	8	42.0 N	155.0 E	12	25	M 45	2 NM		0979.0	2.0	1.0					
QUATSINO SOUND	ELAW3	8	53.7 N	177.2 E	23	09	M 57	.5 NM	85	0976.0	0.6		11	23			

Vessel	Nationality	Date	Position of Ship		Time GMT	Wind			Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C.		Sea Waves?		Swell Waves		
			Lat. deg.	Long. deg.		Dir. 10°	Speed kt.					Air	Sea	Period sec.	Height ft.	Dir. 10°	Period sec.°	Height ft.
	PACIFIC	FEB.																
GALLEON PRIDE	DZPK	9	52.9 N	169.2 E	00	06	M	55	200 YD	07	0970.2	8.0	2.0	15	26	06	12	23
STAR DOVER	H9AU	9	42.3 N	149.3 E	00	31		48	5 NM	07	0987.3	- 1.0						
SHINKOO MARU	JEUS	9	49.6 N	174.8 E	00	23	M	53	.5 NM	58	0968.5	2.0	3.5	6	16.5	23	11	34.5
PACIFIC ANGEL	3EXQ2	9	51.4 N	135.1 W	12	35	M	50	2 NM	14	0995.5	6.0		4	8	35	6	13
PHOENIX	8KCJ	9	46.4 N	133.9 W	12	35	M	49	10 NM	02	0992.0	9.0	12.0	8	10	35	9	13
PRINCE OF TOKYO	A8SJ	9	48.1 N	154.3 E	12	04	M	45	2 NM	78	0980.5	1.0	3.0	6	11.5	04	6	13
EXXON HOUSTON	KHBA	9	49.9 N	133.2 W	18	32	M	45	5 NM	21	0993.5	6.2	7.2	7	14.5	32	9	19.5
GOLDEN DAISY	6ZSG	9	47.5 N	131.0 W	21	22	M	50	2 NM	96	0995.0	6.0	1.0	7	11.5	22	7	11.5
PHOENIX	8KCJ	10	45.9 N	131.0 W	00	32	M	48	10 NM	01	1004.5	8.0	12.0	8	10	32	9	13
	D9MS	10	33.9 N	160.0 E	00	27	M	39	2 NM	21	1000.0	9.0	18.0	5	8	18	10	34.5
GALLEON PRIDE	DZPK	10	51.0 N	160.0 E	00	04	M	48	200 YD	07	0981.3	- 3.0	2.0	14	26	05	13	29.5
GREAT LAND	WFDP	10	49.1 N	126.7 W	00	08	M	48	2 NM	25	0992.0	10.0	10.0	3	10	14	6	10
PRESIDENT TYLER	WEZN	10	52.7 N	166.9 E	06	09		33	5 NM	15	0969.5	2.2	1.1	4	5	05	12	29.5
	3FWS2	10	42.7 N	174.5 W	21	01	M	56	.5 NM	06	0966.0	9.0	5.5	13	21	36	14	23
ASIA HEPON	A8DD	11	46.4 N	166.3 W	00	10	M	50			0974.0	6.0	10.0	8	11.5	10	8	11.5
PRESIDENT WASHINGTON	WHPN	11	44.5 N	124.8 W	18	19	M	48	2 NM	60	1012.0	9.4	11.7	8	19.5	18	10	23
EASTERN VENTURE	JQWT	12	46.5 N	150.8 W	00	24	M	52	.25 NM		0971.5	7.0	6.5	10	14.5	23	11	19.5
BRIGHT SUN	H3AG	12	46.2 N	141.9 W	06	22	M	51	5 NM	01	0986.5	13.0	10.0	9	11.5	20	10	13
ARCO SAG RIVER	WLDF	12	47.0 N	150.5 W	18	28	M	30	5 NM	02	0984.5	4.4	6.1	6	14.5	27	8	46
HANJIN POHANG	D8DN	13	49.4 N	148.8 W	00	24	M	60			0977.0	7.0	9.0	20	26	25	20	26
EASTERN VENTURE	JQWT	13	47.3 N	142.0 W	00	27	M	44	5 NM	03	0987.0	6.5	8.0	9	18	25	11	29.5
WESTWARD VENTURE	KHJB	13	54.2 N	136.4 W	00	18	M	45	5 NM	80	0971.0	4.4	8.3	5	11.5	21	5	14.5
ARCO SAG RIVER	WLDF	13	46.6 N	150.7 W	06	32	M	24	10 NM	01	0993.5	4.4	6.1	3	13	29	6	32.5
	ELQC	13	35.5 N	151.9 E	06	15	M	32	5 NM	21	1010.0	11.0	8.0	12	16.5	15	14	29.5
SEALAND ENDURANCE	KGJX	13	50.4 N	146.0 W	06	27	M	49	5 NM	25	0982.8	3.5	5.0	9	24.5	22	7	13
SEA DIAMOND	3FJR2	13	50.8 N	131.7 W	12	27	M	35	10 NM	02	0984.2	9.0	10.0	11	36	27	12	36
ASIA HUNTER	5LWE	13	37.0 N	164.1 E	21	14	M	45	2 NM	80	1006.0	10.0	12.0	6	6.5	14	6	8
	DDKX	13	54.5 N	148.1 W	21	23		55	5 NM	26	0983.5	2.1	3.8	7	16.5	27	13	24.5
SEA DIAMOND	3FJR2	14	51.8 N	134.1 W	00	27	M	34	5 NM	02	0998.5	9.0	13.0	10	39	27	12	39
ARCTIC TOKYO	5LJT	14	53.7 N	179.8 W	06	32	M	50	50 YD	77	0989.0		2.0					
BRIGHT SUN	H3AG	14	46.5 N	148.6 W	06	28	M	45			0988.0	10.5	8.0	8	14.5	28	9	14.5
ASIA HUNTER	5LWE	14	38.7 N	168.5 E	18	25	M	45	5 NM	03	0994.5	11.0	10.0	5	13	25	6	13
GLACIER BAY	KACF	14	50.8 N	130.2 W	18	17		45	2 NM	62	1000.0	5.5	6.7	4	11.5	27	10	23
SEALAND ENDURANCE	KGJX	14	48.7 N	127.1 W	18	15	M	45	2 NM	80	1008.5	7.2	8.0	6	19.5	24	8	10
PORTLAND	WNDF	14	52.0 N	133.3 W	18	14	M	48	1 NM	07	0991.5	5.6	4.4	3	11.5	14	6	29.5
CHEVRON OREGON	WNHL	14	54.6 N	136.8 W	18	14	M	45	5 NM	81	0988.2	6.1		4	6.5	15	6	19.5
S.S. MORIL MERIDIAN	KGSM	15	51.7 N	131.0 W	00	14		50	2 NM	63	0998.9	6.1	7.2	6	13	16	8	14.5
ASIA HUNTER	5LWE	15	39.2 N	173.5 E	12	27	M	50	5 NM	07	1001.0	6.0	11.0	5	13	27	8	13
PRESIDENT WASHINGTON	WHPN	15	54.0 N	150.5 W	12	24	M	34	10 NM	03	0991.5	4.4	6.1	5	5	24	10	32.5
SEA DIAMOND	3FJR2	15	53.9 N	146.5 W	18	28	M	23	10 NM	02	0992.2	9.0	9.0	12	32.5	29	10	39
EASTERN FRIENDSHIP	H8LP	15	53.4 N	179.5 E	18	36	M	45			0995.0	- 2.0	3.0	3	13	36	5	10
ROSINA TOPIC	ELAJ6	16	45.0 N	138.8 W	00	30		45	10 NM	02	1007.0	7.0	9.0	7	11.5	30	8	11.5
CHEVRON MISSISSIPPI	WXBR	16	54.8 N	148.7 W	12	18		60	2 NM	81	0975.8	2.5	3.9	4	10	17	6	23
SEA DIAMOND	3FJR2	16	53.9 N	154.4 W	18	05	M	24	5 NM	02	0969.2	4.0	5.0	12	8	05	12	32.5
EXXON NEW ORLEANS	WNDM	16	53.9 N	136.2 W	18	17	M	50	5 NM	02	1001.5	6.7	6.1	6	10	17	8	13
MISSION SANTA CLARA	WKJO	17	57.0 N	140.1 W	00	15		45	.5 NM	07	0997.0	7.7	5.5	5	6.5	15	8	16.5
EXXON NEW ORLEANS	WNDM	17	52.7 N	137.2 W	00	17	M	60			1000.1	8.5	6.2	7	24.5	16	8	19.5
SEA DIAMOND	3FJR2	17	54.0 N	158.2 W	06	35	M	13	10 NM	01	0987.5	4.0		12	24.5	32	11	32.5
ORIENTAL EXECUTIVE	D5AN	17	35.8 N	150.8 E	06	27	M	45	10 NM		1014.0	7.0	19.0			32	10	6.5
PRESIDENT LINCOLN	KDBG	17	46.2 N	149.5 W	06	27	M	28	10 NM	01	1004.0	6.7	6.1	8	19.5	26	12	29.5
S.S. LNG TAURUS	WDZW	17	31.4 N	129.4 E	06	33	M	50	2 NM	19	1000.5	10.0	20.0	10	11.5			
	BHFK	17	37.0 N	177.7 W	12	27	M	55	.5 NM	81	0994.5	14.0	11.0					
LEDA MAERSK	OULU	18	35.2 N	154.7 E	06	23		55	.25 NM	62	0987.0	16.0		6	16.5	14	12	32.5
PRESIDENT GHANT	WEZD	18	39.3 N	152.8 E	06	01	M	53	2 NM	61	0984.8	3.3	8.9	10	19.5			
	HOML	18	33.7 N	158.5 E	12	22	M	51	.5 NM		0998.0	15.0						
	LIQL	18	36.4 N	160.2 E	12	20	M	58	1 NM	07	0988.0	14.0	15.9					
ORIENTAL EXECUTIVE	D5AN	18	37.5 N	163.0 E	18	19	M	70	.5 NM	54	0988.0	15.0	15.0					
CHARLOTTE MAERSK	OYIU	18	38.3 N	168.8 E	18	21		40	.5 NM		0999.0	8.5		XX	32.5			
CHEVRON MISSISSIPPI	WXBR	19	42.0 N	150.3 W	06	24		45	5 NM	07	0998.0	7.1	8.3	3	8	27	6	21
SEALAND ENDURANCE	KGJX	19	54.0 N	155.0 W	18	32	M	55	5 NM		0999.2	- 4.4	4.0	11	23	32	11	24.5
	D5DW	20	49.6 N	171.2 W	00	15	M	48	200 YD	26	0992.0	3.5	4.0	7	16.5	15	7	13
MELLON WHEC 717	NDIT	20	54.3 N	174.6 W	06	11	M	46	.5 NM	86	0982.0	1.0	3.3	4	5	14	10	19.5
PRESIDENT HOOVER	WTSI	20	34.8 N	144.7 W	06	35	M	26	10 NM	02	1028.5	16.1	15.5	6	6.5	31	12	31
	9VYW	20	45.5 N	176.0 E	12	23	M	40	1 NM		0981.0	2.0	4.0	6	13	24	12	32.5
PORTLAND	WNDF	20	50.8 N	150.5 W	12	27	M	60			0990.0	- 7.8	3.3	5	16.5	29	6	26
	DDKX	20	48.4 N	163.1 E	15	29		60	5 NM	01	0993.2	0.0	2.5	11	19.5	29	XX	32.5
CORNUCOPIA	KPJC	20	49.6 N	165.0 E	18	28		60	5 NM	85	0986.2	- 1.2	4.4	9	19.5	31	15	24.5
PRESIDENT GRANT	WEZD	20	44.9 N	173.9 E	18	26	M	48	10 NM	02	0991.0	2.8	5.0	6	13	31	12	24.5
	9VYW	21	45.5 N	179.5 E	00	25	M	42			0995.0	3.0	4.0	6	13	24	10	32.5
CORNUCOPIA	KPJC	21	49.3 N	163.5 E	00	29		55	5 NM	16	0993.5	- 3.9	4.4	7	14.5	29	13	14.5
PRESIDENT GRANT	WEZD	21	44.9 N	173.6 E	00	26	M	48	10 NM	15	0995.7	3.9	5.6	8	11.5	25	11	29.5
CHEVRON OREGON	WNHL	21	53.6 N	135.1 W	00	27	M	26	10 NM	01	1008.0	3.3		4	10	28	6	29.5
PRESIDENT PIERCE	WURV	22	37.5 N	151.4 E	18	35		45	10 NM		1022.0	8.8	14.4	7	8	35	8	8
SEALAND DEFENDER	KGJB	23	34.9 N	142.6 E	06	16	M	45	5 NM		1008.0	12.0	19.0	6	16.5			
PACIFIC ANGEL	3EXQ2	23	35.0 N	148.7 E	18	19	M	61	200 YD	59	0999.0	10.0		9	16.5	18	10	19.5
EXXON HOUSTON	KHBA	23	49.0 N	133.0 W	18	09	M	48	2 NM	63	0996.5	7.7	7.2	5	13	10	10	19.5
SEALAND INNOVATOR	WGJF	23	48.1 N	139.9 W	18	03		65	2 NM	82	0999.0	5.0	7.0	6	24.5	03	8	19.5
PACIFIC ANGEL	WGKF	23	43.7 N	170.9 E	18	07	M	45	5 NM	14	0997.2	3.0	3.0	6	19.5			
PACIFIC APPOW	3EXQ2	24	35.0 N	150.5 E	00	22	M	49	.5 NM	52	0997.0	16.0		9	14.5	22	10	24.5
AMERICA SUN	JGFN	24	48.2 N	136.7 W	00	36	M	53	1 NM	61	0991.5	6.0		6	13	36	10	19.5
	WNEJ	24	41.7 N	153.2 E	06	10	M	45	200 YD	95	1008.5	4.0	7.8	5	14.5	08	6	24.5
EXXON NEW ORLEANS	WNDM	24	43.2 N	128.3 W	18	31	M	58			1006.8	10.0	11.1	8	10	29	12	32.5
GOLDEN DAISY	6ZSG	24	47.5 N	131.0 W	21	03	M	46	5 NM	19	1016.0	7.0	12.0	7	11.5	03	7	11.5
EXXON HOUSTON	KHBA	25	43.2 N	127.3 W	00	31	M	45	5 NM	15	1014.0	11.0	8.9	7	24.5	28	6	13
EXXON NEW ORLEANS	WNDM	25	43.0 N	128.7 W	00	31	M	50			1016.0	11.0	16.0	9	29.5	32	10	32.5
CLARA MAERSK	OWIK	25	42.6 N	156.7 W	06	26		55	5 NM		1001.3	5.0						
KEIYO	JKMQ	25	45.6 N	152.4 W	18	27	M	52	.5 NM	45	0987.0	4.0	7.0	8	13	27	14	16.5
GOLDEN DAISY	6ZSG	25	50.4 N	136.5 W	21	19	M	49	5 NM	58	1006.5	6.5	12.0	7	11.5	19	7	11.5
	WGJF	26	52.6 N	164.6 W	00	33		60	5 NM	66	1014.5	- 2.0	1.0	5	14.5	33	6	29.5
CLARA MAERSK	OWIK	26	41.5 N	146.5 W	06	26		50	5 NM		1008.0	5.5		18	29.5			
SEALAND INNOVATOR	WGKF	26	47.2 N	160.6 W	06	31	M	45	5 NM		1010.0	0.0	4.0	7	29.5			
POLAR ALASKA	5LEU	26	52.4 N	164.9 E	12	08	M	62	.5 NM	07	0990.0	0.0	0.0	14	26	10	14	26
PHOENIX	8KCJ	26	54.3 N	157.1 W	12	01	M	49	5 NM	02	0998.0	4.0	7.0	5	11.5	01	8	13
AMERICA SUN	WNEJ	26	47.4 N	167.0 E	12	11	M	23	5 NM	00	0973.0	3.0		6	19.5	15	6	32.5
BARBARA FOSS	WYL4978	26	57.4 N	144.6 W	12	09	M	43	1 NM		1000.3	8.0	9.4	8	10	17	8	29.5
SEA DIAMOND	3FJR2	26	37.0 N	133.4 E	18	28	M	36			1008.0	6.0	8.0	9	31	28	9	31

Vessel	Nationality	Date	Position of Ship		Time GMT	Wind		Visibility n. mi.	Present Weather code	Pressure mb.	Temperature °C		Sea Waves*		Swell Waves		
			Lat. deg.	Long. deg.		Dir. 10°	Speed kt.				Air	Sea	Period sec.	Height ft.	Dir. 10°	Period sec.*	Height ft.
	PACIFIC	FEB.															
USNS NOTAWAY (T-AO67A)	NIPX	26	36.8 N	133.7 E	18	28	N 45	5 NM	01	1007.7	3.9	8.9	6	16.5			
PHILADELPHIA	WJ6O	26	49.8 N	127.9 W	18	13	N 50	2 NM	63	1015.0	6.1	8.9	5	14.5	16	XX	19.5
MISSION SANTA CLARA	WKJO	26	57.4 N	140.7 W	18	10	45	2 NM	61	0997.2	6.1	5.0	5	10	10	8	32.5
PACIFIC ARROW	JGFM	27	54.4 N	165.1 W	00	01	N 45	.5 NM	72	1013.5	0.0		7	13	36	9	23
SKOUBORD	LION	27	34.6 N	153.4 E	06	18	52	.5 NM	63	0990.5	13.5	14.0	8	19.5			
SEA DIAMOND	3FJR2	27	35.0 N	130.5 E	12	28	M 35			1022.0	6.0	9.0	9	29.5	23	8	26
PRESIDENT HOOVER	A8PJ	27	42.1 N	156.7 E	12	13	N 48	2 NM	97	0988.0	1.0	2.0	9	10	13	6	13
	WTST	27	34.4 N	145.5 E	12	22	30	5 NM	13	0997.0	5.5	16.6	6	13	27	9	29.5
SEALAND LIBERATOR	3EWQ	27	32.9 N	161.3 E	18	18	N 45	5 NM	80	1000.5	15.8	17.0	5	14.5	18	6	19.5
	WHRP	28	34.9 N	148.4 E	06	30	N 47	5 NM	23	1001.2	6.0	15.0	8	14.5	32	10	16.5
	PACIFIC	MAR.															
SAMUEL S	SLMX	1	47.3 N	154.0 E	00	29	N 45	.25 NM	97	0986.0		2.0	8	13	23	12	41
SEALAND DEVELOPER	WHDR	1	51.6 N	137.2 W	06	16	N 48	10 NM	21	0977.6	4.5	7.0					
VAN HAWK	D2TU	1	51.7 N	134.6 W	12	20	N 46	2 NM	17	0994.0	7.0	4.0					
GLACIER BAY	DYHS	1	54.5 N	135.5 W	12	22	N 49	.5 NM	61	0986.5	6.0	10.0	9	13	22	10	16.5
	WACF	1	51.0 N	131.6 W	12	19	48	10 NM	07	1001.0	7.0	6.1	3	16.5	20	9	16.5
SONIC INTREPID	WACN	1	50.9 N	173.4 W	12	26	45	10 NM		0998.0	5.0	10.0	6	13	26	8	13
SEALAND LIBERATOR	WHRP	1	39.3 N	174.5 E	16	26	N 45	10 NM	01	1002.0	9.0	11.0					
SONIC INTREPID	WACN	2	50.1 N	139.6 W	12	23	45	10 NM	01	1005.0	5.0	9.5	9	13	24	8	13
SEALAND LIBERATOR	WHRP	2	39.5 N	177.4 W	12	28	N 54	10 NM	01	1000.0	6.5	9.0	9	16.5	30	14	36
WHATSING SOUND	ELAW3	4	41.6 N	172.2 W	16	27	N 48	5 NM	07	0978.5	5.0		7	23			
WHATSING SOUND	ELAW3	5	41.6 N	174.6 W	04	25	N 48	5 NM	07	0977.0	6.0		7	23	27	9	28
SEA BELLE	ELCN7	5	41.7 N	145.1 E	04	10	N 26	5 NM	07	1015.5	3.0	4.0	3	3	06	26	42.5
SEALAND LIBERATOR	WHRP	5	39.5 N	171.7 W	04	27	N 48	10 NM		0988.6	8.0	10.0	8	16.5	29	14	36
ARCO PRUDHOE BAY	WPFU	5	42.2 N	155.2 W	04	26	45	1 NM	25	0996.5	13.9	12.9	4	16			
	A6FJ	5	44.2 N	172.4 W	06	05	N 38	1 NM	59	0970.0	5.0	5.0	8	16.5	05	10	29.5
TYSON LYKES	WSCJ	4	34.7 N	150.5 E	04	20	45	10 NM	21	1010.9	13.3	11.7	2	8	22	6	10
VAN HAWK	D5ZU	4	53.7 N	152.7 W	06	16	M 50	.25 NM	44	0984.0	6.0	1.0	5	11.5	18	8	23
SNOHOMISH	LION	4	34.3 N	165.7 W	06	29	40	5 NM	64	0999.0	9.0	14.0	15	32.5			
CHEVRON MISSISSIPPI	WXBR	5	57.9 N	147.2 W	00	17	25	10 NM	07	1016.7	4.5	5.0	4	6.5	17	9	29.5
PRESIDENT JEFFERSON	WPGL	5	37.1 N	164.6 W	00	10	45	10 NM		0992.2	14.0	12.9	9	19.5	30	14	29.5
PRESIDENT TYLER	WLZM	5	49.3 N	173.6 W	16	23	10	2 NM	12	0986.1	1.4	1.1	3	3	05	10	29.5
GOLDEN DAISY	6ZSC	6	43.3 N	149.8 E	02	05	N 45	5 NM	50	1010.0	1.0	4.0	7	13	05	7	13
PRESIDENT WILSON	WAPD	6	47.2 N	151.9 W	16	14	55	5 NM	82	0986.1	6.2	5.0	5	11.5	14	12	21
PRESIDENT JEFFERSON	WPGE	6	34.2 N	152.3 W	12	20	45	2 NM	63	1001.0	13.3	15.6	6	13	27	12	19.5
CLARA MAERSK	OWIP	6	32.9 N	164.2 W	16	26	50	5 NM	25	0999.0	10.0		14	44			
CHARLOTTE MAERSK	OYIU	6	41.7 N	157.9 W	16	09	45	1 NM	65	0981.0	6.0		8	10			
CHEVRON MISSISSIPPI	WXBR	6	54.2 N	153.1 W	18	20	45	2 NM	07	0989.2	3.8	3.3	4	8	18	10	24.5
SNOHOMISH	LION	7	34.3 N	151.2 W	00	27	50			0999.0	15.5	16.0	10	29.5			
CLARA MAERSK	OWIR	7	35.4 N	165.6 W	04	30	60	5 NM		1005.0	10.5		15	36			
NEPTUNE DIAMOND	9VVI	7	42.9 N	140.5 W	06	09	N 60	1 NM	61	0981.2	7.5						
DELTA	A6MX	7	37.4 N	179.1 W	12	27	N 53			0991.0	10.0	14.0					
	A6FJ	7	43.2 N	145.1 W	12	16	N 47	2 NM	81	0986.0	10.0	8.0	6	8	10	9	13
AMERICAN LANCER	WDJD	7	52.4 N	178.4 E	12	27	45	10 NM	07	1002.8	12.6	16.0	9	13	27	10	29.5
	3EEJ	7	53.7 N	141.9 W	18	29	52			1006.0	14.0	21.0	7	13	27	8	16.5
	3EEJ	8	52.6 N	143.4 W	00	27	52	5 NM	25	1009.0	17.5	21.0	7	23	28	10	26
SKOUBORD	LION	8	34.2 N	149.4 W	00	26	50			1004.0	15.0	15.5	17	32.5			
AMERICAN LANCER	WDJD	8	54.6 N	177.4 W	00	29	45	10 NM	15	1009.3	12.2	11.1	7	13	29	12	26
GALLANT PRIDE	DZPR	8	32.4 N	167.4 W	06	29	N 45			1007.5	14.3	14.0	5	11.5	28	5	14.5
CLARA MAERSK	OWIR	8	33.2 N	172.2 W	06	32	47	10 NM	02	1003.9	8.4	16.0	18	32.5			
MYSTIC CANYON	WSFR	8	13.9 N	94.2 W	18	36	45	5 NM		1018.0	25.6	27.2	6	6.5	36	10	23
CHEVRON MISSISSIPPI	WXBR	9	36.9 N	155.4 W	04	27	55	2 NM	07	0990.8	8.5		2	11.5	27	6	16.5
	9LMT	9	34.6 N	176.6 E	01	27	N 49	10 NM	02	1010.0	14.0	18.1	6	16.5	26	7	31
CLARA MAERSK	OWIN	10	37.2 N	167.4 W	12	29	54	5 NM		1003.0	9.5						
SHINNAN MARU	JLUS	11	34.4 N	152.6 E	04	09	N 24	< 50 YD	22	0973.5	2.0	7.5	14	19.5	09	14	29.5
BALLARD	3LVG2	11	40.5 N	160.7 E	06	12	N 47	1 NM		0982.0	3.0	6.0	9	14.5	12	9	19.5
DELTA	A6DS	11	37.4 N	153.4 E	12	27	N 70	50 YD	07		4.0	6.0	12	16.5	27	12	18
AMERICAN TRADER	WLZM	11	39.1 N	148.9 E	18	30	45	5 NM	15	1007.0	7.8	23.8	6	8	31	14	11.5
	3FTJ2	12	34.6 N	153.6 E	00	29	47	.5 NM	47	1002.0	6.8	13.0					
PRESIDENT GRANT	WLZG	12	42.6 N	162.7 E	00	03	N 45	5 NM	26	0972.2	2.2	4.4	8	10	14	9	19.5
	9LMT	12	34.4 N	167.9 W	01	26	N 29	10 NM	01	1014.0	12.0	15.0	6	29.5	25	7	24.5
GREAT OCEAN	3LF1	12	37.9 N	174.5 E	16	25	N 48	5 NM	07	0978.0	9.0	10.0	8	16.5	25	7	32.5
MERMIA	OXON	12	44.9 N	175.2 E	18	24	N 50	2 NM	62	0966.5	8.5		10	26			
GREAT OCEAN	3LF1	13	38.1 N	176.1 E	00	27	N 48	5 NM	07	0982.0	9.0	11.0	8	16.5	26	7	16.5
MERMIA	OXON	13	44.6 N	178.0 E	00	23	N 52	10 NM		0970.1	8.8		12	29.5			
ROLASART TUA	PLVA	13	35.9 N	179.9 E	00	24	N 46			0991.2	13.5	15.0	17	23	24	15	19.5
HANJIN KAOHSIANG	3LZL2	13	42.6 N	160.4 E	16	27	N 38	2 NM		1005.0	3.0	9.0	20	32.5	27	15	24.5
PRESIDENT JEFFERSON	WPGL	13	34.8 N	129.7 W	18	24	48	10 NM	01	1015.6	15.6	15.0	7	8	25	8	16.5
PRESIDENT WASHINGTON	WHRA	13	49.0 N	157.3 W	21	11	N 50	2 NM	57	0986.0	3.9	3.9	8	21	13	10	28
PRESIDENT WASHINGTON	WHPN	14	49.0 N	156.0 W	04	13	N 48	2 NM	61	0984.0	5.6	3.9	8	21	12	11	32.5
ROLASART TUA	PLVA	14	36.0 N	168.9 W	16	25	N 48	2 NM	04	1000.8	12.0	12.0	27	23			
SS P T SAN DIEGO	WSVR	14	41.2 N	126.7 W	16	26	26	10 NM	61	1010.6	10.6	10.6	2	13	27	6	32.5
SS P T SAN DIEGO	WSVR	15	40.3 N	125.6 W	04	23	22	10 NM	07	1011.9	11.1	11.1	3	10	21	8	32.5
MERMIA	OXON	15	44.3 N	156.9 W	06	26	N 56	2 NM		0989.5	5.5		10	23			
	HPOP	15	33.7 N	170.4 E	16	33	M 55	200 YD	81	0992.2	9.0	16.0	4	13	27	4	11.5
	DLMX	15	37.0 N	173.7 E	21	36	50	200 YD	65	0986.2	5.0		6	13	03	10	16.5
DELTA	3FIZ2	16	34.9 N	179.1 E	04	23	47	200 YD		0983.8	15.3	17.0					
	A6DQ	16	32.8 N	179.9 E	04	19	N 65	.5 NM	07	0979.0	15.3	10.0	12	19.5	23	14	19.5
MERMIA	DLMA	16	37.0 N	174.6 E	00	34	55	.5 NM	81	0991.6	5.2	8.9	8	16.5	34	12	29.5
BALLARD	OXON	16	45.7 N	147.8 W	04	27	N 48	5 NM		0995.5	5.5		12	26			
	3LVG2	16	44.6 N	161.1 W	18	14	M 47			0984.0	7.0	6.0	10	21	15	11	23
CHEVRON WASHINGTON	KFDE	16	40.9 N	126.2 W	16	15	45	1 NM	61	1005.0	10.0		3	18	18	4	13
SEALAND ENDURANCE	WDJX	16	42.8 N	169.4 W	16	26	M 65			0979.0	10.0	10.0	10	24.5	22	18	39
CONFIDENCE WMEC 619	NMRW	16	42.9 N	126.2 W	23	27	M 80	200 YD	82	0989.5	10.0	10.0	6	29.5	28	7	19.5
	A6FJ	17	61.0 N	138.3 W	04	23	N 12	10 NM	02	0991.0	8.5	8.0	5	10	22	6	29.5
SEALAND ENDURANCE	WDJX	17	40.8 N	167.5 W	04	27	N 50			0994.5	8.3	10.0	10	23	27	18	39
AMERICAN TRADER	WLZM	17	37.3 N	161.9 W	04	25	45	10 NM	07	1005.8	12.2	14.4	4	6.5	25	10	13
BALLARD	3LVG2	17	45.7 N	152.9 W	18	26	M 58	.5 NM		0990.5	6.0	6.0	11	23	26	10	21
CHEVRON MISSISSIPPI	WXBR	17	44.4 N	151.4 W	16	27	40	5 NM	16	0997.0	6.0	6.1	5	19.5	27	8	29.5
GENEVIEVE LYKES	WDJA	17	32.7 N	144.2 E	18	27	45	10 NM	02	1006.4	12.3	15.5	9	10	27	10	14.5
PRESIDENT TYLER	WLZM	18	41.8 N	126.3 W	00	23	15	5 NM	07	1027.0	11.1	10.0	3	5	29	XX	29.5
WESTWARD VENTURE	KHJB	16	50.2 N	128.7 W	06	17	M 47	2 NM	53	1007.0	7.2	8.9	4	6.5	15	8	10
	H6DF	16	50.7 N	137.5 W	18	22	M 45	5 NM	03	1002.0	9.0	7.5	8	11.5	25	12	39
KOREAN VENUS ONE	D3XX	19	34.8 N	156.4 W	00	26	M 48			1009.0	11.0	16.0	5	8	24	13	14.5
	H6DF	19	51.1 N	139.4 W	04	24	M 45	5 NM		1002.0	9.0	7.5	7	11.5	23	12	42.5
WESTWARD VENTURE	KHJB	19	54.0 N	136.0 W	04	20	M 45	5 NM	02	0998.0	4.4	6.6	3	8	23	6	19.5
PRESIDENT TYLER	WLZM	19	50.4 N	136.4 W	12	24	45	10 NM	00	1015.0	7.0	6.7	4	6.5	27	12	41
AMERICA SUN	WNCJ	19	55.9 N	140.7 W	16	18	N 19	10 NM	03	1008.5	7.0	6.1	19	19.5	19	6	32.5
	3FVS2	19	43.7 N	174.6 E	23	21	M 45	.5 NM	19	0985.0	5.0	5.0	15	26.5	01	15	29.5
PRESIDENT TYLER	WLZM	20	52.1 N	143.1 W	00	26	12	10 NM	03	1012.7	6.7	4.2	5	8	24	13	14.5
SEA LANTERN	5MSH	20	53.2 N	172.6 W	12	02	M 45	1 NM	54	0984.0	4.0	5.0	7	13	02	7	13
PRESIDENT TAYLOR	WJBH	21	41.5 N	157.3 E	04	09	60	10 NM	56	0992.0	1.7	4.4	4	13	09	8	14.5

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U.S. Voluntary Observing Ship Weather Reports

January, February and March 1984

SHIP NAME	VIA RADIO	VIA MAIL
ABUL KALAM AZAD	61	
ACADIA	22	73
ADDIRIYAH	51	35
ADRIAN MAERSK	31	46
AL SALAMA	27	
ALASKA STANDARD	11	36
ALASKAN	31	145
ALBATROSS IV	19	97
ALBERT MAERSK	15	37
ALERT	25	
ALEUTIAN DEVELOPER	20	97
ALMERIA LYKES	39	149
AMCO TRADER	34	107
AMCO VOYAGER	30	61
AMELIA TOPIC	1	
AMERICA SUN	45	135
AMERICAN ACCORD	37	51
AMERICAN ACE	1	
AMERICAN ALTAIR	52	160
AMERICAN APOLLO	48	167
AMERICAN AQUARIUS	104	208
AMERICAN ARGO	22	102
AMERICAN ARGOSY		5
AMERICAN ASTRONAUT	37	188
AMERICAN DRACO	20	111
AMERICAN ENVOY	29	62
AMERICAN EXPLORER	80	
AMERICAN HIGHWAY	22	
AMERICAN LANCER	28	172
AMERICAN LARK	56	149
AMERICAN LEGACY	55	22
AMERICAN LEGEND	4	
AMERICAN LEGION	60	38
AMERICAN LIBERTY	49	158
AMERICAN LYNX	52	139
AMERICAN MARKETER	73	146
AMERICAN MERCHANT	102	89
AMERICAN PIONEER	66	171
AMERICAN PURITAN	60	132
AMERICAN RESERVIST	51	118
AMERICAN RESOLUTE	62	188
AMERICAN RIGEL	14	63
AMERICAN SUN	24	66
AMERICAN TITAN AK 1008	12	134
AMERICAN TRADER	26	147
AMERICAN VEGA	57	138
AMERICANA	10	24
AMOCO BALTIMORE	30	
AMOCO CAIRO	1	
AMOCO YORKTOWN	26	31
AQUARIUS	56	142
ARCO ALASKA		6
ARCO ANCHORAGE	33	80
ARCO FAIRBANKS	59	95
ARCO JUNEAU	24	65
ARCO PRUDHOE BAY	32	79
ARCO SAG RIVER	55	152
ARCO TEXAS	33	51
ARCTIC TOKYO	31	220
ARGONAUT	31	117
ASHLEY LYKES	9	
ASIA HERON	13	55
ASIA HUNTER	98	154
ASIA INDUSTRY	12	14
ASIA NO 14	19	89
ATIGUN PASS	56	75
ATLANTIC RAINBOW	19	
AUSTANGER	14	42
AXEL JOHNSON	43	47
B T ALASKA	75	275
BALD BUTTE	20	145
BALLARD		54
BALTIMORE TRADER	42	159
BANGLAR PROGOTI	5	
BARBER MENESTHEUS	1	
BARBER PRIAM		32
BARBER TAIF	30	
BARBER TENNESSEE	8	
BARBER TERRIER	36	64
BARBER TOBA	30	67
BARBER TONSBERG	13	
BARBER TSU	38	79
BARNWORTH	8	7
BARRANCA	19	
BASSWOOD WLB388	18	21
BAY	1	
BAY BRIDGE	96	90
BAYANO	53	107
BELO ORIENTE	20	44
BERNINA		151
BIBB WHEC 31	73	
BOGASARI DUA	46	87
BOGASARI LIMA	32	74
BOHEME	61	112
BORINQUEN	30	70
BRIGHT SUN	88	194
BROOKS RANGE	23	45
BUILDER	1	
BUNGA MELAWIS	112	
C K APOLLO	8	
CAGUAS	1	
CANAL ACE		157
CAPRICORN	6	3
CARIBE MAR	6	10
CASON J CALLAWAY	2	6
CENPAC 2	18	70
CHAPMAN	30	
CHARLES LYKES	58	183
CHARLES PIGOTT		169
CHARLOTTE MAERSK	93	121
CHASTINE MAERSK	146	
CHEMICAL PIONEER	23	98
CHEROKEE WMEC 165	9	57
CHERRY VALLEY	67	114
CHESAPEAKE	82	157
CHEVRON ANTWERP	35	138
CHEVRON ARIZONA	26	6
CHEVRON BURNABY	4	77
CHEVRON CALIFORNIA	59	182
CHEVRON COLORADO	50	66
CHEVRON COPENHAGEN	20	
CHEVRON FRANKFURT	5	
CHEVRON LOUISIANA	39	78
CHEVRON MISSISSIPPI	92	223
CHEVRON NORTH AMERICA		111
CHEVRON OREGON	48	127
CHEVRON PACIFIC		12
CHEVRON PERTH		52
CHEVRON ROME		8
CHEVRON WASHINGTON	37	80
CHEYENNE	1	
CHRISTIAN MAERSK	25	83
CHUEN ON	33	
CITRUS WLB300	1	
CLARA MAERSK	27	87
CLIFFORD MAERSK	10	
CLOVER CGC		58
CLOVER TRUST	10	
COLUMBIA	11	
COLUMBUS AMERICA	72	
COLUMBUS LOUISANA	50	
CONDORA	18	
CONFIDENCE WMEC 619	1	45
COPIAPO		24
CORNUCOPIA	33	187
COSMOS	77	136
COURAGEOUS WMEC 622	18	9
COVADONGA	38	147
CRYSTAL STAR	74	188
CYGNUS	41	67
D ALBERTIS	14	66
D L BOWER		112
DA MOSTO	36	59
DANA AFRICA	7	
DANA AMERICA	9	
DAVID P REYNOLDS	65	137
DAVID PACKARD		54
DAVID STARR JORDAN	25	48
DEFIANCE	20	138
DEL RIO	7	27
DELAWARE II	84	50
DELAWARE TRADER	22	57
DELTA CARIBE	9	38
DELTA MAR	15	4
DELTA NORTE	21	27
DELTA SUD	6	33
DIANA	13	51
DISCOVERER OSS	116	
DISCOVERER SEVEN SEAS	175	287
DOCTOR LYKES	58	189
DOLLY TURMAN	9	37
DONA MAGDALENA		105
DRAGOR MAERSK	51	141
DUANE	8	
DUBHE	27	126
DURABLE	24	77
EASTERN BRIDE	48	
EASTERN DIAMOND	31	48
EASTERN FRIENDSHIP	49	138
EASTERN GLORY	12	
EASTERN PACIFIC	77	46
EASTERN ROYAL	45	
EASTERN VENTURE	63	28
EATON GLORIA	43	
EDITA	29	
EDWARD RUTLEDGE	1	10
EILEEN INGRAM	75	150
ELIZABETH LYKES	24	57
EMPIRE STATE	25	
ESSO PALM BEACH	28	46
EVER LOADING		152
EVER SPRING	8	9
EVER VALUE	3	8
EXPORT CHALLENGER	4	15
EXPORT CHAMPION	7	55
EXPORT COMMERCE	24	75
EXPORT FREEDOM	48	118
EXPORT PATRIOT	34	66
EXXON BALTIMORE	34	86
EXXON BATON ROUGE	14	24
EXXON CHESTER	11	6
EXXON GETTYSBURG	4	9
EXXON HOUSTON	45	90
EXXON HUNTINGTON	8	21
EXXON JAMESTOWN	36	54
EXXON LEXINGTON	34	31
EXXON NEW ORLEANS	47	69
EXXON NEWARK	12	42
EXXON NORTH SLOPE	47	66
EXXON PHILADELPHIA	21	29
EXXON WASHINGTON	19	30
FALSTRIA	57	122
FERNCROF	34	51
FESTIVALE	2	
FIREBUSH WLB 393	86	
FJORD STAR	14	132
FORTALEZA	37	10
FRANCIS SINCERE NO 6	73	29
FRED H. MOORE		10
FREDERICKSBURG	51	106
FRIENDSHIP	181	
FROTASIRIUS		37
FUJIYASU	27	
GALLEON DIGNITY	36	129
GALLEON INTEGRITY	15	44
GALLEON PRIDE	15	125
GALLEON TRUST	9	31
GALVESTON	63	116
GAMA GETAH	6	21
GAMA ROBUSTA	8	19
GENEVIEVE LYKES	9	88
GERONIMO		37
GLACIER BAY	25	64
GLOBAL FRONTIER	100	224
GOLDEN BEAR	62	
GOLDEN CLOVER	10	
GOLDEN DAISY		50
GOLDEN ORCHID	1	
GOWA	8	45
GREAT LAND	48	119
GREAT OCEAN	23	48
GREEN AUKLET	21	
GREEN FOREST	26	18
GREEN FOWARD	36	45
GREEN MAYA	101	41
GREEN SAIKAI	17	26
GREEN STAR	26	20
GREEN SUMA	32	
GULF SHIPPER	8	
HAMILTON WHEC 715	2	
HANJIN KWANGYANG		64
HANJIN POHANG	18	31
HARBOUR BRIDGE	64	51
HARDANGER	10	19
HASSAN MERCHANT		31
HOEGH CAIRN	9	
HOEGH CLIPPER	40	129
HOEGH MARLIN	41	31

SHIP NAME	VIA RADIO	VIA MAIL
HOEGH MIRANDA	1	56
HOEGH SUN	6	46
HOEGH TRIGGER	3	17
HOHSING ARROW	1	163
HOHSING BREEZE	21	52
HOTAKA MARU	181	91
INGER	64	207
IRIS ISLAND		45
IRVING MIAMI	33	
ITALICA	34	96
J LOUIS	27	42
J T HIGGINS		72
JAMES LYKES	1	4
JAPAN AMBROSE	64	42
JAPAN APOLLO	96	99
JARVIS WHEC 725	7	
JEAN LYKES	20	32
JEFF DAVIS	1	
JOHN LYKES	32	58
JOSEPH LYKES	35	
JUNO	48	67
JUPITER NO 1	28	24
JUSTINE FOSS		76
JUTHLANDIA	57	131
KANE T-AGS 27	106	166
KAUAI	91	214
KEIYO	31	58
KENTUCKY HOME	1	
KENWOOD	32	150
KEYSTONE CANYON	49	251
KEYSTONER	36	98
KIWALAN	48	44
KNORR	111	244
KOFUKU MARU	28	
KOREAN AMETHYST	5	
KOREAN FIR	25	3
KOREAN JACEWON	12	4
KOREAN PRIDE	41	18
KOREAN WONIS JIN	76	127
KOREAN WONIS ONE	11	30
KOREAN WONIS SEVEN	25	79
KOREAN WONIS SUN	32	29
KRPAN	9	
KYOHO MARU	58	24
LASH ATLANTICO	26	106
LASH ITALIA	7	
LASH PACIFICO	16	31
LAURA MAERSK	32	90
LAVAUX	33	
LEDA MAERSK	34	86
LEISE MAERSK	41	101
LESLIE LYKES	42	65
LEXA MAERSK	34	131
LICA MAERSK	17	61
LILLOOET	96	167
LUCENT STAR	30	
LUNA MAERSK	36	61
LURLINE	75	203
LYNCH T-AGOR 7	26	67
M.V. DACEBANK	96	
M.V. TENCHBANK	101	
M/V EASTERN WISEMAN	1	
MAERSK TRITON	37	103
MAERSK WAVE		33
MAERSK WIND		39
MAIN EXPRESS	36	55
MAJAPAHIT	81	21
MALACCA	28	
MALLORY LYKES	93	151
MALLOW WLB 396	124	
MAMMOTH FIR	9	52
MAMMOTH PINE	1	
MANHATTAN DUKE	79	
MANUKAI	74	221
MANULANI	66	95
MARCONA CONVEYOR		55
MARDI GRAS	19	20
MARGARET JOHNSON	40	104
MARIA TOPIC	33	84
MARINE SUPERVISOR	17	86
MARJORIE LYKES	26	34
MASON LYKES	83	145
MATARAM	1	
MAUI	96	212
MAUMEE	115	213
MCKINNEY MAERSK	1	
MELLON WHEC 717	104	61
MELVILLE	126	
MELVIN H. BAKER	1	
MEONIA	81	133
METEOR T-AKR 9	32	10
MIDGETT WHEC 726	11	184
MILLER FREEMAN	128	176
MING AUTUMN	6	
MING GALAXY	9	18
MING GLORY	26	
MING MOON	2	
MING STAR	55	19
MING SUN	2	17
MING WINTER	1	
MISSION SANTA CLARA	72	151
MOANA PACIFIC	24	54
MOBIL AERO	13	44
MOBIL ARCTIC	37	141
MOBILFUEL	1	
MOKU PAHU	115	165
MORGENTHAU WHEC 722	7	6
MORNING GLORY	45	
NACIONAL MONCHIQUE	72	83
NAGARA	5	
NANCY LYKES	5	15
NAVASOTA	14	
NEPTUNE CRYSTAL	64	
NEPTUNE DIAMOND	70	97
NEPTUNE JADE	46	67
NEPTUNE PEARL	46	166
NEW INDEPENDENCE	49	214
NEWARK	26	200
NORDHVAL	1	
NORSE MARSHAL	28	74
NORSE PILOT	17	
NORTHERN LIGHT	34	
NORTHWIND WAGB 282	13	234
NORWAY	96	125
OAKLAND	50	183
OCEAN STEELHEAD	55	
OCEANIC	142	205
OCEANOGRAPHER	1	
OCTA	32	140
OGDEN DYNACHEM		76
OGDEN THAMES	18	
OJI GLORIA	43	
OLEANDER	132	182
OLGA TOPIC	21	
ORCO MINER	37	
ORCO TRADER	42	165
OREMAR	9*	
ORIENTAL ANGEL		3
ORIENTAL EDUCATOR	21	41
ORIENTAL EXECUTIVE	56	139
ORIENTAL SOVEREIGN	37	136
ORIENTAL TAIO	31	
OTTO N. MILLER	33	126
OVERSEAS ARCTIC	54	178
OVERSEAS CHICAGO	27	127
OVERSEAS JUNEAU	38	71
OVERSEAS MARILYN	22	70
OVERSEAS NEW YORK	63	102
OVERSEAS VIVIAN	51	101
PACBARON	33	26
PACBARONESS	8	
PACDUCHESS	4	
PACDUKE	22	13
PACEMPEROR	38	
PACGLORY	19	16
PACIFIC ANGEL		290
PACIFIC ARROW	97	52
PACIFIC ERA	33	
PACIFIC SAGA	18	
PACIFIC SUNSHINE	12	38
PACIFIC VENTURE	63	26
PACIFIC WING	59	
PACKING		30
PACLADY	16	6
PACMAJESTY	29	27
PACMERCHANT	26	
PACMONARCH	19	
PACNOBLE	41	26
PACSTAR	22	
PAN DYNASTY	3	
PARALLA	44	85
PAUL PIGOTT	11	
PENNSYLVANIA SUN	1	6
PETERSBURG	5	123
PHILADELPHIA	77	79
PHILLIPS OREGON	3	
PHOENIX	41	59
PIONEER CRUSADER	22	77
PITTSBURGH	43	61
POLAR ALASKA		65
POLAR SEA	154	
POLAR STAR WAGB-10	104	79
POLYNESIA	29	155
PORTLAND	27	89
POTOMAC TRADER	26	134
PRESIDENT ADAMS	16	
PRESIDENT CLEVELAND	16	35
PRESIDENT FILLMORE	18	20
PRESIDENT GRANT	72	122
PRESIDENT HOOVER	83	94
PRESIDENT JACKSON	42	80
PRESIDENT JEFFERSON	92	159
PRESIDENT JOHNSON	78	198
PRESIDENT KENNEDY	41	
PRESIDENT LINCOLN	72	85
PRESIDENT MADISON	91	149
PRESIDENT MC KINLEY	95	253
PRESIDENT MONROE	53	115
PRESIDENT PIERCE	66	175
PRESIDENT ROOSEVELT	1	
PPESIDENT ROXAS	16	11
PRESIDENT TAFT	32	44
PRESIDENT TAYLOR	36	135
PRESIDENT TYLER	41	109
PRESIDENT VAN BUREN	13	178
PRESIDENT WASHINGTON	105	197
PRESIDENT WILSON	24	42
PRINCE OF TOKYO	49	145
PRINCE WILLIAM SOUND	3	51
PROSPERIDAD	43	64
PROVINCIA DE EL ORO	14	44
PUNTA BRAVA	58	31
PUNTA MALVINAS	21	21
QUATSINO SOUND		164
QUINTINA	47	
RAINIER	18	
REGINA MAERSK	64	182
RESEARCHER	92	111
RIGOLETTO	26	
ROACHBANK	117	
ROBERT E LEE	18	
ROSINA TOPIC		53
RUSH WHEC 723	2	49
RUTH LYKES	3	36
S.S. LNG TAURUS	30	107
S.S. MOBIL MERIDIAN	64	177
S.S. PONCE	1	2
S/S EXXON BOSTON	20	44
S/S MOBILOIL	3	16
SACRAMENTO	31	84
SAINT LOUIS	68	190
SALVADOR	13	
SAM HOUSTON	22	31
SAMOA	28	101
SAMUEL S	31	10
SAN PEDRO	18	
SANKO MAPLE	5	
SANSINENA II	7	17
SANTA JUANA	15	
SANTA MAGDALENA	54	36
SANTA MARIANA	59	143
SAPPHIRE	4	
SAUDI MAKKAH	44	
SAUDI RIYADH	18	
SAVONITA	20	27
SEA ASTRA	81	169
SEA BELLS		119
SEA DIAMOND		173
SEA FAN		123
SEA KING NO I	38	
SEA LANTERN	19	48
SEA QUEEN NO 1	82	162
SEA WORLD	12	70
SEALAND ADVENTURER	71	174
SEALAND CONSUMER	48	139
SEALAND DEFENDER	62	157
SEALAND DEVELOPER	74	171
SEALAND ECONOMY	66	168
SEALAND ENDURANCE	50	160
SEALAND EXPRESS	24	124
SEALAND FREEDOM	36	152
SEALAND INDEPENDENCE	87	155
SEALAND INNOVATOR	86	141
SEALAND LEADER	47	146
SEALAND LIBERATOR	25	93
SEALAND PACER	31	167
SEALAND PATRIOT	59	197
SEALAND PIONEER	48	165
SEALAND PRODUCER	44	181
SEALAND VENTURE	55	190
SEALAND VOYAGER	81	60
SEALIFT ANTARTIC	94	
SEALIFT ARABIAN SEA	46	23
SEALIFT MEDITERRANEAN	79	199
SEDGE WLB 402	27	
SENATOR	30	40
SEVEN OCEAN	32	22
SHANGRI LA	1	
SHANNON	3	

SHIP NAME	VIA RADIO	VIA MAIL
SHERMAN WMEC 720	38	80
SHINKOO MARU	68	79
SHIPLEY LYKES	19	51
SHOSHONE T-AO 151		51
SIMBA	5	
SKAUGRAN	53	47
SKOUBORD	41	164
SNOW CRYSTAL	26	65
SOCONY VACUUM	1	30
SOHIO INTREPID	29	87
SOLON TURMAN	2	4
SOUTH LIGHT	36	
SOUTHWEST CAPE	96	
SOVEREIGN VENTURE	19	82
SPIRIT OF LIBERTY	47	
SS B T SAN DIEGO	80	287
STAR CARRIER	31	90
STAR DIEPPE	24	
STAR DOVER	49	103
STAR ENTERPRISE	26	
STAR MALAYSIA	7	
STAR PHILLIPPINES	2	
STAR THAILAND	43	133
STARWARD	47	8
STEADFAST	2	
STELLA LYKES	33	29
STONEWALL JACKSON	29	24
STREAM DOLPHIN	29	14
STREAM HAWSER	11	
SUGAR ISLANDER	51	
SUNBELT DIXIE	192	
SURVEYOR	6	14
SUSQUEHANNA	5	
SWEETBRIER WLB 405	11	
T F L INDEPENDENCE	64	123
T F L LIBERTY	40	188
TAI CORN	60	
TAIKO VENTURE	71	66
TAMAROA WMEC-166	26	45
TARASCO	19	51
TEXACO GHENT	15	
TEXACO MONTANA		27
TEXACO RHODE ISLAND	1	48
TEXAS TRADER	27	98
TFL DEMOCRACY	27	146
TFL ENTERPRISE	39	171
TFL EXPRESS	19	118
TFL FRANKLIN	44	
TFL FREEDOM	42	138
TFL JEFFERSON	4	
THOMAS G THOMPSON	77	147
THOMAS WASHINGTON	1	
THOMPSON LYKES	24	43
THOMPSON PASS	8	43
TILLIE LYKES	59	163
TONCI TOPIC	21	97
TONSONIA	47	168
TOWER BRIDGE	63	26
TOWNSEND CROMWELL	214	271
TOYOTA #24	142	
TRANSCOLUMBIA	26	80
TROPIC SUN	5	26
TUMILCO	1	
TYSON LYKES	68	194
UNITED SPIRIT	10	69
UNIVERSE	21	
USCGC ESCAPE		15
USCGC IRONWOOD WLB 297	24	
USCGC LAUREL (WLB 291)	12	100
USCGC LIPAN	77	119
USCGC RED CEDAR	1	20
USCGC RESOLUTE WMEC 62	39	
USCGC SUNDEW WLB 404		6
USCGC VALIANT(WMEC-621	1	
USCGC VIGOROUS	22	
USGS S.P. LEE	42	21
USNS APACHE	20	
USNS BARTLETT	80	229
USNS COMET TAKR 7	30	41
USNS MOHAWK	8	
USNS NEOSHO T-AO-143	59	67
USNS NODAWAY (T-AOG78)	2	62
USNS PAWCATUCK TAO-108		180
USNS POWHATAN TATF 166	73	8
USNS RIGEL TAF58	6	60
USNS SEALIFT CHINA SEA	50	116
USNS SEALIFT PACIFIC	60	61
USNS SIRIUS	21	4
USNS SOUTHERN CROSS	110	137
USNS SPICA	33	
VALLEY FORGE	61	99
VAN CONQUEROR	53	164
VAN HAWK	94	174
VANGUARD TAG 194	16	
VELMA LYKES	23	75
VENTUROUS WPC 625		17
WALCHAND	12	106
WALTER RICE	43	161
WASHINGTON TRADER	61	196
WECOMA	31	78
WESTERN SUN	14	98
WESTWARD		20
WESTWARD VENTURE	62	167
WESTWIND WAGB 281	152	187
WHITING	2	
WILLIAM E MUSSMAN	30	99
WILLIAM HOOPER	2	
WORLD CANDOUR	78	157
WORLD RANGER	2	
WORTH	26	43
YAMASHIN MARU	63	22
YOCONA WMEC 166	9	
YUKON T-AO 152	47	
ZEPHUNTER	64	136
ZEUS	30	45
ZIM HONGKONG	21	
ZOELLA LYKES	19	2
3FEB		44
3EEJ	26	47
3FET2		75
3EGC2		114
3FKJ2		177
3ELX	19	59
3EOR	11	22
3ERW2		39
3ETZ	20	9
3EUB	29	23
3EWQ	53	214
3FAB	7	30
3FDZ2		119
3FGE2		46
3FIZ2		107
3FMU	2	2
3FVS2		51
5JTN		34
5LAW	3	32
5LGF	7	36
5LHE	7	7
5LOT	1	1
5LOZ	13	15
5LUB	48	310
5LWQ	15	188
6ZGT	12	2
6ZRP	14	16
6ZRT	18	94
7KIH	24	24
7LDN	21	37
8LUP	55	37
9DHT		10
9JPU		24
9VJK	15	188
9VYW		55
A8FW	31	
A8PJ	39	102
BHFK	50	67
BICC	1	39
C6FA3		24
CSDB	31	101
CSDQ	23	41
CSDU	55	74
D5DW	24	53
D5DZ	34	176
D5HZ		61
D5KF	23	65
D9HS	59	167
D9IH		22
DDKX	22	311
DU		1
DWDX		34
DXFU		49
DZDI	2	12
DZHC	3	28
DZIA	4	100
DZLF		37
DZQK	16	76
DZUT	8	44
DZXI	12	81
DZYX		67
EAFG	6	32
ELAJ4		35
ELAQ4		66
ELBG2		36
ELBJ3		117
ELBM4		50
ELBU	11	32
ELCF4		14
ELDE2		38
ELHJ	11	1
ELKN	15	16
ELOC	28	30
ELOC9		90
ELZL2		27
H3DR	29	62
H8DF	41	25
H8J0	51	52
H8YU		10
H8ZQ	38	47
H8DP		122
HEAG		1
HOMH	2	13
HOML	45	196
HONF	14	119
HPAU	75	95
HPCC	4	52
HPET	23	24
HPJI	13	24
HPOP	70	147
HPTF	26	161
HZLG	36	123
HZST		16
I8HP		11
I9ZC	11	35
JAV8	5	30
JCGV	51	119
JKMG	20	11
JMBV		16
KACN	35	94
KAST		16
KCAO	53	174
KCKP		28
KDGR	2	52
KGJF	20	152
KGYE	18	60
KHTR		65
KJGD		65
KLSM		16
KMFN		1
KMSM		3
KNCX	28	81
KNDB	3	140
KPCJ	1	11
KRDR	46	256
KSGP		16
KSRG		2
KVNJ		13
LDEF	29	75
LEVR	7	12
LGSX		27
LIGL		49
LIQL		72
LOVT		4
LRUR	19	24
NEFK		5
NHMX	43	74
NHNU	1	
NIRY		8
NJAX	8	30
NJOV	113	95
NJOX		18
NJTD	23	48
NPTF		49
NSHI	34	106
NTRI	105	139
NVOP		94
NYGG	14	94
NZIT	85	140
OWCY	16	33
OXCR		31
OXDF		42
OXIT		28
OXTH	17	39
OYIV		77
OZSD	29	126
SGAY		13
SGCT		24
SKX7	9	18
SMGC		25
VTJS	28	65
WSVB		5
WBVY	20	43
WCJC		36
WCWR		46
WDGR		6
WDZR	57	157
WFKW	47	98
WGJF	72	198
WHNL	2	17
WHST		19
WJRP		24
WLDP	24	51
WLDU	87	188
WLGF	60	139
WLY4978		52
WMRT		24
WMRV		80
WPGO	98	181
WSNF		35
WSSS	2	18
WTGO		4
WUVR		3
WYGO		42
WZHK	40	149
WZJO		12
ZCKP	38	74
ZCUT	77	173

SUMMARY: GRAND TOTAL VIA RADIO 26193 GRAND TOTAL VIA MAIL 54695

U.S. NDBC Climatological Data

January, February and March 1984

JANUARY 1984			AIR TEMPERATURE (DEG C)									SEA TEMPERATURE (DEG C)								AIR-SEA TEMPERATURE DIFFERENCE (DEG C)							
BUOY	LAT	LONG	OBS	DAYS	MAX	DY	HR	MIN	DY	HR	MEAN	OBS	DAYS	MAX	DY	HR	MIN	DY	HR	MEAN	OBS	DAYS	MAX	DY	HR	MIN	DY	HR	MEAN
41001	34.9N	072.9W	740	31	21.4	11	08	06.3	20	13	14.4	742	31	21.3	06	19	18.4	22	03	19.4	742	31	01.6	18	23	-12.4	20	13	-05.0
41002	32.3N	075.3W	744	31	23.4	11	08	11.9	31	22	18.3	744	31	24.2	05	18	21.3	07	22	22.7	744	31	00.6	27	22	-10.2	21	18	-04.5
41006	29.3N	077.3W	739	31	24.1	28	00	15.6	31	22	20.5	739	31	23.9	28	15	22.0	31	05	23.3	739	31	00.7	28	00	-07.3	01	05	-02.8
42001	25.9N	089.7W	744	31	25.7	18	14	14.8	11	22	21.2	744	31	27.2	15	20	23.3	01	04	25.5	744	31	00.0	25	16	-11.2	11	22	-04.3
42002	26.0N	093.5W	743	31	22.8	06	22	11.5	19	21	18.8	743	31	23.6	01	02	20.5	21	15	21.8	743	31	00.7	30	17	-09.2	19	21	-03.0
42007	30.1N	088.9W	725	31	16.4	10	07	00.1	11	15	09.4	743	31	12.4	17	01	08.0	05	16	10.8	744	31	04.9	10	07	-11.5	19	10	-01.7
42008	28.7N	095.3W	718	31	16.9	30	09	00.2	21	12	09.4																		
42011	29.6N	093.5W	676	30	13.9	24	03	01.3	19	08	08.5																		
42012	29.9N	087.1W	401	17	19.6	10	09	02.4	11	15	12.9	401	17	19.9	03	22	16.9	11	00	18.9	401	17	00.6	10	12	-16.7	11	15	-06.1
44003	40.8N	068.5W	655	29	11.1	11	10	00.0	12	05	04.2	743	31	07.4	01	07	05.2	22	00	06.2	743	31	04.2	11	10	-06.9	12	12	-02.5
44004	38.5N	070.7W	722	31	17.6	11	05	00.0	21	17	08.6	741	31	23.5	16	12	14.1	30	00	16.7	742	31	02.1	11	05	-19.0	20	13	-08.3
44005	42.7N	068.3W	507	28	08.1	10	22	00.0	01	19	03.0	742	31	06.6	01	01	04.9	22	11	05.9	742	31	02.8	25	05	-06.6	01	19	-03.8
44007	43.5N	070.1W	183	13	06.3	25	22	00.0	26	11	02.6	712	31	06.2	01	19	02.0	19	23	04.5	657	29	02.9	25	22	-05.5	03	19	-03.4
44008	40.5N	069.4W	645	29	11.7	11	02	00.0	08	16	04.0	739	31	08.4	05	20	05.3	26	18	07.0	739	31	04.9	11	02	-07.3	16	11	-03.5
44009	38.5N	074.6W	469	24	10.1	10	16	00.0	11	11	04.1	656	26	07.9	06	10	03.2	27	02	05.3	664	28	04.7	27	14	-07.3	08	05	-02.4
46001	56.3N	148.3W	034	03	04.9	30	23	01.4	31	20	03.7	028	03	05.1	31	14	04.7	30	17	05.0	728	31	00.2	30	23	-03.6	31	20	-00.3
46002	42.5N	130.3W	740	31	13.5	03	22	07.7	17	16	10.8	740	31	12.1	04	23	11.1	22	00	11.8	740	31	01.5	03	22	-03.9	17	16	-01.0
46003	51.9N	155.7W	248	31	07.5	25	21	00.4	04	15	04.1	248	31	05.4	01	03	04.7	31	03	05.0	248	31	02.6	25	21	-04.8	04	15	-00.9
46004	51.0N	136.0W	025	02	08.3	31	13	06.8	31	22	07.6	025	02	07.7	31	01	07.5	31	21	07.7	743	31	00.6	01	01	-00.7	31	18	00.6
46005	46.1N	131.0W	737	31	12.0	03	03	05.4	31	10	09.1	738	31	10.4	01	20	09.7	15	03	10.1	742	31	01.6	03	03	-04.4	31	10	-00.9
46006	40.7N	137.7W	737	31	14.4	03	09	08.2	15	07	11.5	741	31	12.9	27	23	12.3	01	00	12.6	741	31	01.9	03	09	-04.4	15	03	-01.1
46010	46.2N	124.2W	734	31	12.2	02	08	01.9	18	16	07.8	734	31	10.8	10	23	05.2	19	14	09.2	738	31	03.8	30	23	-08.0	15	10	-01.4
46012	37.4N	122.7W	743	31	17.9	27	08	09.0	09	15	12.0	743	31	13.3	18	22	11.7	15	11	12.6	743	31	05.0	27	08	-03.5	16	08	-00.6
46013	38.2N	123.3W	742	31	15.0	27	14	08.2	18	16	11.2	742	31	12.7	24	21	11.2	28	05	12.0	742	31	03.7	27	14	-03.9	13	18	-00.8
46014	39.2N	124.0W	741	31	14.7	26	23	08.0	14	12	11.3	741	31	13.1	07	11	11.8	17	13	12.4	742	31	02.1	28	23	-04.5	14	12	-01.1
46017	60.3N	172.3W	043	07	02.5	08	00	00.1	09	18	01.5																		
46022	40.8N	124.5W	739	31	13.4	24	00	07.1	17	14	10.7	740	31	12.5	07	13	10.7	01	14	11.7	740	31	01.2	04	00	-04.1	17	14	-01.0
46023	34.3N	120.7W	128	07	17.3	27	02	11.4	30	17	14.4	128	07	15.3	27	21	13.8	26	20	14.2	721	31	03.2	27	02	-02.9	30	17	00.9
46025	33.6N	119.0W	741	31	20.2	29	00	12.3	16	21	15.8	741	31	17.2	05	00	15.8	17	15	16.3	741	31	03.7	28	01	-04.0	16	21	-00.5
46027	41.8N	124.4W	740	31	13.7	02	22	05.9	14	17	09.9	738	31	12.0	04	23	09.4	02	08	10.8	742	31	03.2	30	18	-05.0	14	17	-00.9
46028	35.8N	121.7W	743	31	16.0	28	18	10.2	16	18	12.7	743	31	14.3	28	23	13.1	31	08	13.5	743	31	02.6	28	18	-03.3	16	18	-00.8
51001	23.4N	162.3W	741	31	24.6	01	20	19.7	04	22	22.9	742	31	24.7	12	02	23.5	14	19	23.8	742	31	00.8	18	00	-04.2	04	22	-01.0
CSBF1	29.7N	085.4W	713	31	18.3	24	20	02.0	20	09	10.2																		
DPLN6	42.6N	079.5W	164	14	05.6	27	08	00.0	02	08	01.2																		
DISW3	47.1N	090.7W	050	06	03.4	03	23	00.0	05	16	01.4																		
GLLN6	43.5N	076.3W	137	11	03.1	04	08	00.0	03	09	01.3																		
ROAM4	47.9N	089.3W	043	06	03.9	04	01	00.0	03	09	01.9																		
SPIO1	41.7N	082.8W	123	08	03.0	27	01	00.0	04	07	00.8																		
SGNW3	43.8N	087.7W	092	09	03.5	26	05	00.0	05	15	01.1																		
SISW1	48.3N	122.9W	147	07	09.8	27	21	03.1	31	17	07.1																		
WPOW1	47.7N	122.4W	072	03	09.9	29	04	03.8	31	14	06.4																		

JANUARY 1984			PRESSURE (MB)									WIND SPEEDS (KNOTS)					MEAN WIND SPEED (KNOTS)								
BUOY	LAT	LONG	OBS	DAYS	MAX	DY	HR	MIN	DY	HR	MEAN	OBS	MAX	DY	HR	DIR	N	NE	E	SE	S	SW	W	NW	TOTAL
41001	34.9N	072.9W	742	31	1037.5	22	15	1003.2	31	05	1019.8	739	40	01	02	020	17.7	16.6	13.0	17.6	19.8	16.9	18.6	15.5	17.1
41002	32.3N	075.3W	744	31	1034.7	23	01	1005.7	11	09	1019.7	736	31	12	07	360	14.2	15.7	10.3	13.3	14.1	17.5	15.0	13.2	14.4
41006	29.3N	077.3W	739	31	1029.5	22	15	1007.0	11	09	1019.1	729	33	21	20	010	13.9	15.8	13.5	13.5	12.0	14.7	14.9	12.9	14.0
42001	25.9N	089.7W	744	31	1032.3	01	03	1009.3	26	21	1020.7	743	40	09	09	130	15.7	15.6	14.1	14.1	12.9	11.6	12.8	14.4	14.3
42002	26.0N	093.5W	743	31	1033.9	01	03	1011.2	09	22	1021.8	738	26	19	19	340	14.0	12.9	10.6	10.8	9.2	7.8	8.2	9.9	11.4
42007	30.1N	088.9W	743	31	1036.[illegible]	01	16	1006.1	10	10	1022.0														
42008	28.7N	095.3W	742	31	1038.9	21	17	1010.2	09	21	1023.9	738	35	10	13	320	16.3	14.4	12.4	11.6	8.0	8.3	7.8	15.0	13.7
42011	29.6N	093.5W	743	31	1037.4	21	16	1007.4	09	23	1023.0	734	33	10	15	350	17.7	15.3	13.5	14.1	8.3	8.7	8.0	8.8	13.6
42012	29.9N	087.1W	401	17	1038.1	01	16	1006.6	10	12	1023.2	400	31	10	06	150	12.2	12.4	14.3	16.3	22.0	10.5	14.5	12.7	13.5
44003	40.8N	068.5W	743	31	1039.5	13	12	988.6	31	16	1019.1	736	34	31	17	280	12.6	14.3	14.6	9.9	12.6	11.4	15.2	11.4	13.1
44004	38.5N	070.7W	741	31	1039.3	23	01	995.7	31	11	1019.2	731	30	31	11	260	13.6	15.7	10.9	9.0	14.0	9.6	14.0	11.0	13.0
44005	42.7N	068.3W	741	31	1044.3	13	14	979.5	31	18	1019.1	736	33	31	19	300	14.7	13.3	11.7	10.9	13.4	11.9	13.8	12.8	13.1
44007	43.5N	070.1W	717	31	1047.3	13	14	990.5	31	18	1020.5	700	25	26	04	260	12.6	12.4	8.4	8.0	11.2	12.4	10.9	10.4	11.5
44008	40.5N	069.4W	739	31	1039.9	22	15	990.0	31	15	1019.4	732	27	11	10	350	12.8	11.8	12.2	10.2	12.8	10.9	14.0	10.8	12.1
44009	38.5N	074.6W	659	26	1042.5	22	15	1000.8	31	06	1021.2	654	31	11	04	360	13.4	13.3	5.9	11.2	10.8	12.1	9.1	14.7	12.7
46001	56.3N	148.3W	292	20	1021.1	07	13	980.3	30	14	1008.5	726	31	26	15	250	10.4	12.9	12.8	15.1	15.0	17.8	15.2	15.6	14.8
46002	42.5N	130.3W	740	31	1036.2	26	19	1007.5	07	08	1024.2	727	27	07	09	260	12.4	12.1	10.7	12.9	13.8	11.8	13.0	11.2	12.5
46003	51.9N	155.7W	248	31	1029.2	17	15	972.7	01	15	1002.8	242	32	03	18	360	17.8	10.1	9.1	16.0	14.7	15.6	14.2	14.8	14.2
46004	51.0N	136.0W	387	23	1021.1	11	02	1000.1	01	07	1010.8	347	32	04	17	230	19.0	19.4	13.0	13.7	17.5	21.6	14.0	10.7	16.8
46005	46.1N	131.0W	740	31	1035.1	11	19	999.8	07	10	1022.3														
46006	40.7N	137.7W	741	31	1036.[illegible]	26	20	1003.4	09	00	1022.6	739	40	08	23	190	5.4	6.7	14.7	19.6	18.0	15.8	14.5	11.6	16.3
46010	46.2N	124.2W	735	31	1034.6	26	15	1010.5	22	12	1024.8	732	27	22	11	210	8.7	8.6	13.6	9.2	14.7	13.8	13.7	7.9	12.5
46012	37.4N	122.7W	743	31	1030.[illegible]	01	18	1011.2	13	23	1022.4	725	23	25	15	330	8.7	6.9	5.0	8.6	7.1	4.8	3.9	11.3	08.7
46013	38.2N	123.3W	742	31	1031.[illegible]	01	18	1012.2	14	01	1023.6	702	28	25	15	300	4.3	6.9	8.8	5.9	3.9	2.5	7.4	14.1	09.8
46014	39.2N	124.0W	741	31	1031.1	24	18	1010.4	14	01	1022.6	708	26	26	02	310	7.1	3.7	5.5	9.6	7.3	3.2	5.5	13.1	09.3
46016	63.3N	170.3W	131	19	1041.1	19	15	1000.9	05	12	1019.0	152	36	07	03	090	12.9	18.4	14.0	18.2	25.0		9.7	9.3	16.3
46017	60.3N	172.3W	245	31	1038.[illegible]	18	09	983.0	11	00	1008.0	244	42	29	06	040	18.4	21.9	17.8	16.7	16.3	7.4	6.0	11.8	18.5
46022	40.8N	124.5W	740	31	1034.4	24	18	1011.9	14	04	1023.9														
46023	34.3N	120.7W	354	24	1022.5	27	19	1011.1	13	22	1017.9	647	31	11	14	350	15.9	4.0	4.0	2.5		2.5	6.2	13.9	13.2
46025	33.6N	119.0W	741	31	1025.1	18	18	1010.4	14	01	1019.1	685	27	27	02	030	5.7	8.9	3.7	3.0	3.4	4.5	6.1	7.0	06.2
46027	41.8N	124.4W	740	31	1035.0	24	19	1013.2	14	03	1024.6	726	27	13	02	360	13.0	6.6	6.4	6.2	11.4	5.8	4.3	8.8	09.5
46028	35.8N	121.7W	743	31	1028.4	01	18	1011.1	13	23	1021.8	714	26	26	04	320	6.8	2.9	3.8	6.5	4.1	3.0	4.5	11.7	09.2
51001	23.4N	162.3W	742	31	1023.6	05	21	1007.1	18	00	1017.0	733	22	05	04	050	8.7	14.0	12.0	9.9	10.6	12.4	6.2	5.9	10.9
CSBF1	29.7N	085.4W	742	31	1036.4	01	15	1007.7	10	20	1022.4	743	20	18	23	180	4.3	4.1	6.0	4.6	4.9	3.4	6.9	4.1	04.8
DPLN6	42.6N	079.5W	723	31	1042.1	12	16	997.8	06	08	1021.9	718	36	25	14	240	9.6	9.7	5.1	6.2	6.2	14.3	13.3	12.5	11.4
DISW3	47.1N	090.7W	741	31	1048.5	14	17	994.3	05	19	1020.6	741	34	27	02	280	9.7	11.1	10.3	4.9	8.9	16.9	16.6	15.2	12.7
GLLN6	43.5N	076.3W	742	31	1044.8	13	00	997.6	06	10	1021.1	742	34	20	20	240	6.7	6.9	6.1	15.2	17.0	16.5	17.2	12.1	12.2
ROAM4	47.9N	089.3W	744	31	1049.5	14	16	993.7	05	20	1020.2	743	46	25	04	290	15.5	16.3	11.2	6.0	13.5	17.0	22.2	17.5	16.9
SPIO1	41.7N	082.8W	735	31	1041.[illegible]	21	15	1000.9	06	05	1023.9	731	25	04	03	210	5.8	7.8	7.9	7.6	11.3	12.4	12.7	10.3	10.6
SGNW3	43.8N	087.7W	740	31	1042.7	14	23	996.2	28	21	1021.5	739	33	28	16	180	13.1	11.5	12.5	17.9	15.9	11.2	10.3	10.1	11.5
SISW1	48.3N	122.9W	147	07	1032.5	26	13	1014.4	31	22	1026.1	144	29	26	02	260	5.0	3.5	8.7	11.6	7.6	7.7	14.7	5.3	09.2
WPOW1	47.7N	122.4W	072	03	1029.4	29	12	1014.9	31	23	1023.6	072	17	29	23	360	11.5	8.2		1.7	7.6				09.7

JANUARY 1984			WAVE HEIGHTS (METERS)					FREQUENCY OF WAVE HEIGHTS (%)							
BUOY	LAT	LONG	OBS	MAX	DY	HR	MEAN	<1M	1-1.5M	2-2.5M	3-3.5M	4-5.5M	6-7.5M	8-9.5M	>9.5M
41001	34.9N	072.9W	778	7.0	01	03	2.4		31.1	41.3	13.5	13.2	0.6		
41002	32.3N	075.3W	742	6.0	01	09	2.6	0.8	20.7	38.0	26.1	14.1	0.1		
41006	29.3N	077.3W	739	7.0	22	00	2.4		23.6	45.3	17.9	12.5	0.5		
42001	25.9N	089.7W	738	4.0	11	08	1.4	16.1	55.0	21.1	7.5	0.1			
42002	26.0N	093.5W	717	4.0	10	01	1.4	20.7	47.9	23.4	6.8	0.9			
42007	30.1N	088.9W	543	2.0	10	02	0.8	47.1	51.3	1.4					
42012	29.9N	087.1W	383	4.0	10	09	1.0	41.5	46.4	8.3	2.8	0.7			
44003	40.8N	068.5W	741	5.5	31	20	2.1	0.2	38.3	39.7	19.1	2.9			
44004	38.5N	070.7W	734	6.0	11	09	2.2	5.5	30.9	40.1	12.1	11.0	0.1		
44005	42.7N	068.3W	741	6.0	31	21	2.0	1.8	37.3	42.7	15.9	1.7	0.2		
44007	43.5N	070.1W	659	2.5	04	09	1.0	30.8	57.3	11.8					
44008	40.5N	069.4W	713	4.5	11	11	1.9	2.8	45.3	38.1	11.5	2.2			
46001	56.3N	148.3W	708	10.0	30	05	3.8		8.1	26.5	27.4	20.7	12.1	4.8	0.1
46002	42.5N	130.3W	710	6.0	10	12	2.7	0.4	10.5	49.7	24.5	14.6	0.1		
46003	51.9N	155.7W	248	11.0	29	16	3.8		4.0	24.1	29.8	29.4	10.8	0.8	0.8
46004	51.0N	136.0W	740	11.5	04	19	4.0		11.2	8.1	27.5	40.0	8.9	2.4	1.7
46005	46.1N	131.0W	737	7.0	05	01	3.0	0.1	19.4	22.7	27.4	28.4	1.7		
46006	40.7N	137.7W	741	7.0	09	18	3.0		19.4	29.0	26.1	21.4	3.9		
46010	46.2N	124.2W	713	6.0	05	14	2.2	10.9	24.5	26.6	30.8	6.8	0.1		
46012	37.4N	122.7W	735	4.0	05	20	1.8	7.3	41.0	38.6	12.1	0.8			
46013	38.2N	123.3W	740	4.5	11	20	1.9	5.9	35.1	40.8	16.0	2.0			
46014	39.2N	124.0W	739	5.0	05	15	1.9	6.9	35.3	39.3	14.3	4.0			
46022	40.8N	124.5W	739	5.0	10	15	2.2	4.6	25.8	40.0	23.5	5.9			
46023	34.3N	120.7W	127	3.5	27	11	1.8		59.0	22.8	18.1				
46025	33.6N	119.0W	731	2.5	06	19	1.1	22.5	64.9	12.4					
46028	35.8N	121.7W	742	5.5	11	06	2.0	3.9	34.5	43.8	17.7	4.0			
51001	23.4N	162.3W	741	4.5	03	15	2.5		12.4	46.6	36.7	4.1			

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TOTAL FREQUENCY OF WIND SPEEDS (%)

BUOY	LAT	LONG	CALM	1-3KT	4-10KT	11-21KT	22-33KT	34-47KT	>47KT
41001	34.9N	072.9W		2.8	15.3	55.2	25.8	0.8	
41002	32.3N	075.3W		2.6	23.8	48.5	9.1		
41006	29.3N	077.3W		4.4	25.0	61.0	9.6		
42001	25.9N	089.7W		3.5	24.4	58.7	13.3	0.1	
42002	26.0N	093.5W		7.5	37.4	50.5	4.6		
42008	28.7N	095.3W		2.6	30.5	56.1	10.7	0.1	
42011	29.6N	093.5W	1.0	4.4	34.9	44.0	16.8		
42012	29.9N	087.1W		0.5	32.0	57.3	10.3		
44003	40.8N	068.5W		5.4	28.1	58.8	7.3	0.3	
44004	38.5N	070.7W		4.1	28.7	62.5	4.7		
44005	42.7N	068.3W		3.1	31.6	60.2	5.1		
44007	43.5N	070.1W		8.6	33.1	55.0	3.3		
44008	40.5N	069.4W		4.1	33.7	59.0	3.1		
44009	38.5N	074.6W	3.8	8.3	38.1	41.9	11.8		
46001	56.3N	148.3W		3.7	25.6	52.5	18.3		
46002	42.5N	130.3W		4.7	27.2	55.6	12.5		
46003	51.9N	155.7W		2.1	32.6	47.9	17.4		
46004	51.0N	136.0W		2.0	12.4	67.7	17.9		
46006	40.7N	137.7W		1.6	26.3	42.5	28.6	1.1	
46010	46.2N	124.2W		2.3	33.9	40.2	3.6		
46012	37.4N	122.7W		11.3	58.5	29.8	0.4		
46013	38.2N	123.3W		15.8	46.4	31.5	6.3		
46014	39.2N	124.0W		19.1	41.0	37.7	2.3		
46016	63.3N	170.3W		5.3	30.9	52.2	10.9	0.7	
46017	60.3N	172.3W		2.5	13.9	50.4	28.7	4.5	
46023	34.3N	120.7W		9.4	25.5	51.5	13.6		
46025	33.6N	119.0W		27.6	59.6	12.0	0.9		
46027	41.8N	124.4W	9.6	18.0	41.6	26.4	4.0		
46028	35.8N	121.7W		19.9	43.8	31.5	4.8		
51001	23.4N	162.3W		5.3	38.9	55.1	0.7		
CSBF1	29.7N	085.4W	6.9	35.5	51.1	5.9			
DRLN6	42.6N	079.5W	2.8	9.9	39.3	42.1	8.2	0.6	
DISW3	47.1N	090.7W	1.3	8.5	37.0	39.8	14.6	0.1	
GLLN6	43.5N	076.3W	2.6	8.4	39.1	42.6	9.8	0.1	
ROAM4	47.9N	089.3W	1.1	3.1	20.3	48.3	25.0	3.2	
SBI01	41.7N	082.8W	2.2	7.5	41.6	49.2	1.6		
SGNW3	43.8N	087.7W	0.9	5.3	39.6	52.0	2.1		
SISW1	48.3N	122.9W	2.8	11.1	56.3	29.9	2.8		
WPOW1	47.7N	122.4W	4.2	6.9	50.0	38.1			

TOTAL FREQUENCY OF WIND DIRECTIONS (%)

BUOY	N	NE	E	SE	S	SW	W	NW
41001	22.0	16.6	6.1	7.4	8.3	6.9	13.8	18.9
41002	12.9	19.3	8.6	9.5	5.3	12.1	14.8	17.5
41006	14.5	16.4	9.8	6.0	14.2	7.9	15.6	15.6
42001	14.5	21.0	14.8	6.1	10.6	5.8	8.5	17.1
42002	17.2	28.6	10.4	22.8	6.8	3.8	2.8	9.3
42008	34.7	22.6	13.0	6.5	5.5	4.6	4.4	8.6
42011	18.5	31.9	15.1	9.2	4.3	9.1	5.7	6.2
42012	22.5	29.7	17.8	12.3	0.4	1.1	12.6	9.8
44003	15.5	12.8	7.0	5.6	10.6	6.9	23.9	17.6
44004	17.1	12.1	5.0	1.5	9.8	6.2	27.7	20.4
44005	11.0	8.8	10.1	5.3	11.9	11.4	22.8	18.6
44007	28.3	7.2	1.8	2.5	8.4	10.2	21.5	20.1
44008	12.0	15.0	10.8	6.9	6.3	6.9	21.8	20.3
44009	24.8	9.4	3.6	4.4	7.1	10.7	9.0	30.9
46001	20.4	12.9	3.5	4.9	19.0	16.7	12.6	7.8
46002	9.6	10.6	10.0	10.1	11.7	25.3	12.3	10.3
46003	0.2	11.4	5.7	24.7	29.6	17.4	9.9	1.1
46004	2.0	1.5	3.7	19.6	25.5	29.2	12.6	5.9
46006	4.0	6.8	10.0	5.0	17.2	16.1	9.1	3.8
46010	40.4	11.1	4.6	9.2	5.5	2.1	2.1	23.0
46012	4.3	9.8	29.9	6.3	2.7	1.5	8.9	36.5
46013	14.1	5.9	10.5	20.8	9.4	1.2	3.0	35.2
46014	12.5	59.4	24.5	3.5	1.0		2.0	2.1
46016	14.8	42.7	13.1	13.0	4.8	3.0	1.2	7.4
46017	22.4	2.1	1.2	1.4		0.7	8.2	64.1
46023	13.3	11.2	7.7	2.5	4.1	4.1	20.9	36.2
46025	34.3	9.2	12.8	13.5	13.5	1.9	1.9	10.8
46027	6.9	0.6	1.4	6.0	7.0	3.3	11.8	63.1
46028	8.7	9.6	11.7	21.4	8.1	12.1	4.4	4.1
51001	22.2	23.8	15.9	4.3	3.2	4.4	10.9	15.3
CSBF1	4.9	7.0	2.1	7.3	15.1	38.8	16.8	7.7
DRLN6	5.4	5.0	5.1	12.7	17.7	21.6	18.5	14.1
DISW3	12.4	19.4	7.3	7.5	12.6	13.9	14.0	12.8
GLLN6	26.8	17.3	6.1	1.1	4.3	10.3	18.3	15.7
ROAM4	9.6	3.0	9.0	4.8	15.1	34.4	11.3	12.8
SBI01	11.5	2.6	2.9	2.7	8.1	19.4	26.7	26.1
SGNW3	23.8	1.4	2.8	29.2	10.9	3.1	17.7	11.1
SISW1	57.6	24.3		5.2	12.8			

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% FREQUENCY OF WIND SPEEDS (<4 KTS)

BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W	0.5	0.6	0.2	0.4	0.3	0.3		0.4
41002	32.3N	075.3W	0.4	0.5	0.3	0.7	0.1	0.3	0.4	0.4
41006	29.3N	077.3W	1.0	0.5	0.5	0.1	0.2	0.2	0.7	1.0
42001	25.9N	089.7W	0.4	0.1	0.8	0.5	0.5	0.9	0.4	
42002	26.0N	093.5W	1.4	0.9	0.7	1.4	1.0	0.4	0.6	0.6
42008	28.7N	095.3W	0.2	0.4	0.5	0.2	0.6	0.6	0.1	0.3
42011	29.6N	093.5W	0.2	0.2	0.5	0.1	0.1	0.3	0.2	0.4
42012	29.9N	087.1W	0.3						0.3	0.1
44003	40.8N	068.5W	1.1	0.6	0.2	0.3	0.3	0.2	0.7	1.5
44004	38.5N	070.7W	0.4	0.1	0.1	0.3	0.1	0.1	0.3	0.7
44005	42.7N	068.3W	0.1	0.2	0.1	0.2	0.5	0.5	0.6	0.1
44007	43.5N	070.1W	1.4	0.5	0.5	0.4	0.4	0.2	0.3	1.1
44008	40.5N	069.4W	0.3	0.8	0.6	0.9	0.1	0.5	0.2	0.7
44009	38.5N	074.6W	1.8	0.8	1.5	0.7	0.5	0.2	1.0	2.2
46001	56.3N	148.3W	0.5	0.5	0.4	0.3	0.4	0.2	0.3	0.4
46002	42.5N	130.3W	1.0	0.5	0.1	0.5	0.8	1.1	0.5	1.1
46003	51.9N	155.7W	0.4		0.3	0.5	0.4			
46004	51.0N	136.0W			0.3	0.6	0.3	0.7	0.6	
46006	40.7N	137.7W	0.5	0.2	0.1	0.5	0.2	0.1	0.2	
46010	46.2N	124.2W	0.3	0.2	0.4	0.7	0.5	0.3	0.1	0.3
46012	37.4N	122.7W	2.7	1.6	2.0	1.4	0.9	0.8	0.9	1.1
46013	38.2N	123.3W	2.3	1.7	3.2	2.7	1.4	1.7	1.8	1.9
46014	39.2N	124.0W	4.4	3.3	3.5	2.7	1.7	0.7	1.4	1.4
46016	63.3N	170.3W		2.3	2.8	0.2				
46017	60.3N	172.3W		0.8	0.4	0.1	0.3	0.8		
46023	34.3N	120.7W	1.9	0.9	0.4	1.1		0.5	2.4	2.3
46025	33.6N	119.0W	4.3	2.7	4.4	1.9	2.7	1.5	4.9	5.3
46027	41.8N	124.4W	1.4	3.2	2.9	5.3	1.1	0.7	0.8	2.5
46028	35.8N	121.7W	1.3	0.4	0.7	1.6	3.0	2.1	5.4	5.4
51001	23.4N	162.3W	0.4	0.1	0.7	1.1	0.7	0.4	0.4	0.6
CSBF1	29.7N	085.4W	9.4	9.7	1.9	2.2	1.1	0.7	1.2	7.3
DRLN6	42.6N	079.5W	0.7	1.3	0.8	1.5	2.4	1.5	1.3	0.5
DISW3	47.1N	090.7W	0.6	0.2	0.3	0.4	2.0	0.5	0.3	0.2
GLLN6	43.5N	076.3W	2.4	0.5	0.3	0.7	0.2	0.1		0.1
ROAM4	47.9N	089.3W	0.9	0.9	0.7	0.3		0.3		0.2
SBI01	41.7N	082.8W	1.7	0.9	1.6	0.3	0.5	0.6	1.3	1.2
SGNW3	43.8N	087.7W	0.7		0.1		0.1	0.9	2.1	1.3
SISW1	48.3N	122.9W	4.5	0.7		0.2	1.7	1.0	0.5	2.4
WPOW1	47.7N	122.4W				0.5	2.4			

% FREQUENCY OF WIND SPEEDS (4-10 KTS)

BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W	3.4	3.7	1.7	0.2	0.6	1.2	1.2	3.3
41002	32.3N	075.3W	4.2	2.6	3.8	2.6	1.1	1.9	2.8	4.8
41006	29.3N	077.3W	4.4	3.8	2.3	2.0	5.2	1.6	2.3	3.2
42001	25.9N	089.7W		2.2	2.0	3.0	3.6	3.4	2.5	2.6
42002	26.0N	093.5W	4.3	5.3	3.7	9.6	2.9	2.1	2.8	4.6
42008	28.7N	095.3W	3.2	8.9	5.7	2.2	2.7	5.7	3.5	3.1
42011	29.6N	093.5W		0.5	10.0	8.3	2.4	3.0		0.6
42012	29.9N	087.1W	0.3						1.2	2.1
44003	40.8N	068.5W	6.5	2.8	1.4	2.2	2.3	2.6	4.6	5.8
44004	38.5N	070.7W	4.8	2.1	1.1	3.7	1.7	2.3	3.7	4.2
44005	42.7N	068.3W	2.1	1.2	0.5	2.4	3.1	2.1	7.1	1.1
44007	43.5N	070.1W	1.4	0.5	0.5	0.4	0.4	0.2	3.1	2.1
44008	40.5N	069.4W	0.3	0.8	0.6	0.9	0.1	0.5	0.2	0.7
44009	38.5N	074.6W	1.8	0.8	1.5	0.7	0.5	0.2	1.0	2.2
46001	56.3N	148.3W	0.5	0.5	0.4	0.3	0.4	0.2	0.3	0.4
46002	42.5N	130.3W	1.0	0.5	0.1	0.5	0.8	1.1	0.5	1.1
46003	51.9N	155.7W	0.4		0.3	0.5	0.4			
46004	51.0N	136.0W			0.3	0.6	0.3	0.7	0.6	
46006	40.7N	137.7W	0.5	0.2	0.1	0.5	0.2	0.1	0.2	
46010	46.2N	124.2W	0.3	0.2	0.4	0.7	0.5	0.3	0.1	0.3
46012	37.4N	122.7W	2.7	1.6	2.0	1.4	0.9	0.8	0.9	1.1
46013	38.2N	123.3W	2.3	1.7	3.2	2.7	1.4	1.7	1.8	1.9
46014	39.2N	124.0W	4.4	3.3	3.5	2.7	1.7	0.7	1.4	1.4
46016	63.3N	170.3W		2.3	2.8	0.2				
46017	60.3N	172.3W		0.8	0.4	0.1	0.3	0.8		
46023	34.3N	120.7W	1.9	0.9	0.4	1.1		0.5	2.4	2.3
46025	33.6N	119.0W	4.3	2.7	4.4	1.9	2.7	1.5	4.9	5.3
46027	41.8N	124.4W	1.4	3.2	2.9	5.3	1.1	0.7	0.8	2.5
46028	35.8N	121.7W	1.3	0.4	0.7	1.6	3.0	2.1	5.4	5.4
51001	23.4N	162.3W	0.4	0.1	0.7	1.1	0.7	0.4	0.4	0.6
CSBF1	29.7N	085.4W	9.4	9.7	1.9	2.2	1.1	0.7	1.2	7.3
DRLN6	42.6N	079.5W	0.7	1.3	0.8	1.5	2.4	1.5	1.3	0.5
DISW3	47.1N	090.7W	0.6	0.2	0.3	0.4	2.0	0.5	0.3	0.2
GLLN6	43.5N	076.3W	2.4	0.5	0.3	0.7	0.2	0.1		0.1
ROAM4	47.9N	089.3W	0.9	0.9	0.7	0.3		0.3		0.2
SBI01	41.7N	082.8W	1.7	0.9	1.6	0.3	0.5	0.6	1.3	1.2
SGNW3	43.8N	087.7W	0.7		0.1		0.1	0.9	2.1	1.3
SISW1	48.3N	122.9W	4.5	0.7		0.2	1.7	1.0	0.5	2.4
WPOW1	47.7N	122.4W				0.5	2.4			

% FREQUENCY OF WIND SPEEDS (11-21 KTS)

BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W	11.1	7.2	4.1	6.8	3.8	3.5	8.0	12.4
41002	32.3N	075.3W	14.1	4.5	6.4	3.9	6.9	10.5	11.1	9.4
41006	29.3N	077.3W	8.6	11.6	10.4	1.9	5.2	1.2	5.2	9.6
42001	25.9N	089.7W	8.6	11.6	8.2	2.9	0.7	1.1	1.1	1.8
42002	26.0N	093.5W	11.2	15.9	8.5	4.0	0.7	1.5	0.6	1.7
42008	28.7N	095.3W	15.2	7.8	4.6	1.1	3.1	1.3	1.3	1.5
42011	29.6N	093.5W	9.2	11.6	14.3	6.7	0.2	0.5	3.7	2.7
42012	29.9N	087.1W	9.6	16.4	14.3	6.3	0.2	0.5	3.6	4.2
44003	40.8N	068.5W	5.8	6.0	5.5	3.2	2.6	4.1	6.0	2.6
44004	38.5N	070.7W	4.4	12.8	9.7	1.2	2.6	3.1	7.3	6.3
44005	42.7N	068.3W	8.4	11.2	8.9	1.9	2.2	2.1	5.4	2.6
44007	43.5N	070.1W	4.0	12.3	23.2	15.9	1.1	0.4	7.5	5.0
44008	40.5N	069.4W	4.2	11.7	10.3	1.0	0.2	0.4	7.1	9.6
44009	38.5N	074.6W	7.4	11.8	11.1	5.9	0.7		2.0	2.1
46001	56.3N	148.3W	3.4	11.2	11.7	5.9	1.4	0.7	2.0	2.7
46002	42.5N	130.3W	5.1	10.4	11.7	5.9	1.4	0.7	2.0	2.7
46003	51.9N	155.7W	3.4	13.1	13.0	4.8	3.0	1.2	7.4	
46004	51.0N	136.0W	1.4				0.7	8.2	64.1	
46006	40.7N	137.7W	2.5	4.1	4.1	2.0	4.9	3.2	10.8	
46010	46.2N	124.2W	13.5	13.5	1.9	1.9	10.8			
46012	37.4N	122.7W	6.0	7.0	3.3	11.8	63.1			
46013	38.2N	123.3W	7.1	21.4	8.1	12.1	4.4	4.1		
46014	39.2N	124.0W	4.3	3.2	4.4	10.9	15.3			
46016	63.3N	170.3W	7.3	15.1	38.8	16.8	7.7			
46017	60.3N	172.3W	12.7	17.7	21.6	18.5	14.1			
46023	34.3N	120.7W	1.4		0.7	8.2	64.1			
46025	33.6N	119.0W	13.3	4.3	10.3	18.3	15.7			
46027	41.8N	124.4W	13.5	1.9	1.9	10.8				
46028	35.8N	121.7W	5.9	11.3	19.4	26.7	26.1			
51001	23.4N	162.3W	5.1	10.9	3.1	17.7	11.1			
CSBF1	29.7N	085.4W								
DRLN6	42.6N	079.5W								
DISW3	47.1N	090.7W								
GLLN6	43.5N	076.3W								
ROAM4	47.9N	089.3W	5.9	4.7	0.6	0.7	2.3	7.6	3.3	0.2
SBI01	41.7N	082.8W				0.2	0.9	0.3	0.3	
SGNW3	43.8N	087.7W	1.2			1.5	0.3	0.1		
SISW1	48.3N	122.9W						2.8		
WPOW1	47.7N	122.4W								

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% FREQUENCY OF WIND SPEEDS (22- 33 KTS)

BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W	6.7	4.6	0.1	1.9	3.0	1.9	4.7	2.9
41002	32.3N	075.3W	1.8	2.1		0.2	0.2	1.2	1.1	0.5
41006	29.3N	077.3W	2.1	3.5	0.8	0.1	0.2	1.5	1.7	0.6
42001	25.9N	089.7W	3.3	2.3	0.6	2.0	1.2	1.3	0.4	2.4
42002	26.0N	093.5W	3.0	0.4		0.1				1.1
42008	28.7N	095.3W	6.3	1.9						2.5
42011	29.6N	093.5W	5.9	7.7	1.5	1.5				0.5
42012	29.9N	087.1W	2.4		1.1	2.9	0.2		1.9	1.6
44003	40.8N	068.5W	2.0	1.0	0.1		0.1	0.1	3.5	0.4
44004	38.5N	070.7W	0.2	0.5			0.1	0.0	3.1	0.8
44005	42.7N	068.3W	0.7	0.4	0.4		0.5		2.6	0.8
44007	43.5N	070.1W	0.6					0.1	1.1	1.3
44008	40.5N	069.4W	0.5					0.1	2.3	0.3
44009	38.5N	074.6W	5.1	0.6			0.1	0.0	0.3	5.6
46001	56.3N	148.3W			0.2	4.3	2.6	2.8	2.5	2.7
46002	42.5N	130.3W	1.0			0.0	0.8	0.0	0.6	0.0
46003	51.9N	155.7W	4.2			1.8	2.7	5.2	0.7	2.8
46004	51.0N	136.0W		2.6		0.4	3.6	9.4	1.9	
46006	40.7N	137.7W			0.7	8.9	10.5	6.5	1.4	0.5
46010	46.2N	124.2W					1.7	1.4	0.4	
46012	37.4N	122.7W	0.3						0.1	
46013	38.2N	123.5W							0.2	0.1
46014	39.2N	124.0W	0.2						2.0	
46016	63.3N	170.3W		12.1	6.3	1.8	1.0			0.7
46017	60.3N	172.3W	6.0	17.5	1.8	2.6	0.3		0.4	0.3
46023	34.3N	120.7W	6.5						7.1	
46025	33.6N	119.0W		0.9					0.6	
46027	41.8N	124.4W	3.0			0.1	0.3		0.6	
46028	35.8N	121.7W							4.8	
51001	23.4N	162.3W	0.1	0.5						
CSBF1	29.7N	085.4W								
DRLN6	42.6N	079.5W						4.7	2.2	0.3
DISW3	47.1N	090.7W	0.1	0.6		1.4	5.8	4.2	2.5	
GLLN6	43.5N	076.3W			1.5	1.5	2.0	3.3	1.5	
ROAM4	47.9N	089.3W	5.9	4.7	0.6	0.7	2.3	7.6	3.3	0.2
SBI01	41.7N	082.8W				0.2	0.9	0.3	0.3	
SGNW3	43.8N	087.7W	1.2			1.5	0.3	0.1		
SISW1	48.3N	122.9W						2.8		
WPOW1	47.7N	122.4W								

% FREQUENCY OF WIND SPEEDS (34-47 KTS)

BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W	0.3	0.5						
41002	32.3N	075.3W								
41006	29.3N	077.3W								
42001	25.9N	089.7W				0.1				
42002	26.0N	093.5W								
42008	28.7N	095.3W								
42011	29.6N	093.5W								
42012	29.9N	087.1W						0.3		
44003	40.8N	068.5W								
44004	38.5N	070.7W								
44005	42.7N	068.3W								
44007	43.5N	070.1W								
44008	40.5N	069.4W								
44009	38.5N	074.6W								
46001	56.3N	148.3W								
46002	42.5N	130.3W								
46003	51.9N	155.7W								
46004	51.0N	136.0W								
46006	40.7N	137.7W								
46010	46.2N	124.2W								
46012	37.4N	122.7W								
46013	38.2N	123.5W								
46014	39.2N	124.0W								
46016	63.3N	170.3W								
46017	60.3N	172.3W								
46023	34.3N	120.7W								
46025	33.6N	119.0W								
46027	41.8N	124.4W								
46028	35.8N	121.7W								
51001	23.4N	162.3W								
CSBF1	29.7N	085.4W								
DRLN6	42.6N	079.5W								
DISW3	47.1N	090.7W								
GLLN6	43.5N	076.3W								
ROAM4	47.9N	089.3W								
SBI01	41.7N	082.8W								
SGNW3	43.8N	087.7W								
SISW1	48.3N	122.9W								
WPOW1	47.7N	122.4W								

% FREQUENCY OF WIND SPEEDS (>47 KTS)

BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W								
41002	32.3N	075.3W								
41006	29.3N	077.3W								
42001	25.9N	089.7W								
42002	26.0N	093.5W								
42008	28.7N	095.3W								
42011	29.6N	093.5W								
42012	29.9N	087.1W								
44003	40.8N	068.5W								
44004	38.5N	070.7W								
44005	42.7N	068.3W								
44007	43.5N	070.1W								
44008	40.5N	069.4W								
44009	38.5N	074.6W								
46001	56.3N	148.3W								
46002	42.5N	130.3W								
46003	51.9N	155.7W								
46004	51.0N	136.0W								
46006	40.7N	137.7W								
46010	46.2N	124.2W								
46012	37.4N	122.7W								
46013	38.2N	123.5W								
46014	39.2N	124.0W								
46016	63.3N	170.3W								
46017	60.3N	172.3W								
46023	34.3N	120.7W								
46025	33.6N	119.0W								
46027	41.8N	124.4W								
46028	35.8N	121.7W								
51001	23.4N	162.3W								
CSBF1	29.7N	085.4W								
DRLN6	42.6N	079.5W								
DISW3	47.1N	090.7W								
GLLN6	43.5N	076.3W								
ROAM4	47.9N	089.3W								
SBI01	41.7N	082.8W								
SGNW3	43.8N	087.7W								
SISW1	48.3N	122.9W								
WPOW1	47.7N	122.4W								

FEBRUARY 1984			AIR TEMPERATURE (DEG C)							SEA TEMPERATURE (DEG C)							AIR-SEA TEMPERATURE DIFFERENCE (DEG C)						
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
41001	34.9N	072.9W	691	29	20.2	23 22	05.0	07 20	14.8	696	29	19.6	09 19	18.1	16 06	18.7	696	29	01.1	15 09	-13.4	07 20	-03.9
41002	32.3N	075.3W	694	29	22.2	20 16	09.4	08 06	17.6	694	29	22.7	01 14	20.3	14 03	21.4	694	29	00.9	20 15	-11.3	01 14	-03.7
41006	29.3N	077.3W	695	29	24.3	28 07	17.8	29 18	19.8	695	29	24.7	21 19	21.7	08 08	23.0	695	29	00.5	05 03	-10.7	29 18	-03.2
42001	25.9N	089.7W	696	29	24.7	12 17	17.7	29 20	20.6	696	29	25.1	01 02	20.9	29 09	23.7	696	29	01.8	27 07	-11.3	06 20	-03.1
42002	26.0N	093.5W	694	29	23.7	16 17	12.2	29 13	18.9	694	29	22.8	16 22	19.7	23 11	21.2	694	29	02.2	16 17	-09.1	06 22	-02.4
42007	30.1N	088.9W	690	29	18.7	24 23	00.2	06 10	12.6	694	29	16.5	19 22	10.0	01 12	12.8	696	29	04.6	10 19	-10.4	06 10	-00.3
42008	28.7N	095.3W	687	29	19.5	27 02	07.3	06 14	13.2														
42011	29.6N	093.5W	685	29	18.5	24 23	01.4	06 18	12.3														
44003	40.8N	068.5W	623	29	10.7	04 22	00.0	01 05	05.5	695	29	05.6	06 19	04.6	10 04	05.1	695	29	05.4	29 00	-05.4	01 05	-00.1
44004	38.5N	070.7W	692	29	19.3	28 18	00.1	08 19	09.5	696	29	17.6	28 11	13.0	21 15	14.8	696	29	05.0	24 05	-15.6	08 19	-05.3
44005	42.7N	068.3W	578	28	09.2	15 13	00.0	07 12	04.8	695	29	06.1	13 19	05.1	10 09	05.5	695	29	03.6	15 13	-05.5	07 12	-01.4
44007	43.5N	070.1W	480	25	08.3	15 11	00.0	07 06	03.3	634	29	04.5	25 19	01.9	11 17	03.5	621	27	04.6	15 11	-04.0	03 04	-00.8
44008	40.5N	069.4W	611	29	11.9	16 04	00.0	10 02	05.7	684	29	07.1	16 16	05.1	10 05	06.0	687	29	05.8	28 22	-06.3	01 06	-00.9
44009	38.5N	074.6W	608	28	11.3	15 10	00.0	01 00	05.5	673	29	05.4	18 19	03.2	09 08	04.3	694	29	06.6	15 07	-04.4	29 16	00.6
44010	36.9N	075.7W	341	15	11.6	28 19	02.1	29 14	07.1	341	15	07.5	17 19	05.2	24 13	05.9	341	15	05.5	28 10	-03.6	29 14	01.2
46001	56.3N	148.3W	570	26	06.8	04 03	00.0	06 19	03.1	682	29	05.1	01 01	04.1	09 08	04.5	682	29	01.9	04 03	-05.0	07 00	-01.9
46002	42.5N	130.3W	696	29	12.8	07 12	05.4	21 00	10.4	696	29	11.9	12 10	10.8	29 15	11.4	696	29	01.4	07 12	-06.0	21 00	-01.0
46003	51.9N	155.7W	175	25	06.0	01 06	00.0	28 12	02.6	232	29	04.8	01 09	03.8	22 09	04.2	232	29	01.3	01 06	-04.4	03 15	-02.1
46004	51.0N	136.0W	403	18	08.7	19 12	01.5	21 08	06.3	403	18	07.6	13 05	07.3	26 12	07.5	695	29	01.2	19 12	-06.0	21 08	-00.8
46005	46.1N	131.0W	696	29	11.1	07 17	04.2	20 19	08.5	696	29	10.1	02 23	09.1	21 08	09.6	696	29	01.4	19 15	-05.1	20 19	-01.1
46006	40.7N	137.7W	678	29	13.5	07 02	05.2	20 17	10.4	696	29	12.8	01 01	11.7	23 11	12.1	696	29	01.2	19 05	-06.7	20 17	-01.8
46010	46.2N	124.2W	678	29	13.4	05 03	04.5	02 17	08.5	678	29	10.0	09 00	06.7	02 08	09.2	682	29	04.8	05 03	-04.8	17 15	-00.7
46011	34.9N	120.9W	421	18	15.7	27 21	09.6	22 15	12.4	421	18	14.5	13 23	12.6	27 14	13.5	421	18	02.4	27 21	-03.8	22 15	-01.1
46012	37.4N	122.7W	008	02	11.1	11 11	10.9	11 13	11.2	008	02	12.7	11 12	12.5	11 10	12.6	227	11	-00.4	01 01	-01.8	11 14	-00.4
46013	38.2N	123.3W	693	29	14.6	06 01	08.2	16 15	11.3	693	29	13.2	07 00	10.8	25 19	12.0	693	29	02.1	06 01	-04.2	16 15	-00.8
46014	39.2N	124.0W	694	29	13.7	27 23	06.8	16 19	10.5	694	29	12.5	01 23	11.2	06 16	11.9	694	29	01.9	27 23	-05.5	16 19	-01.5
46022	40.8N	124.5W	667	28	13.4	20 19	06.9	21 20	10.2	656	28	12.2	06 22	10.4	03 16	11.3	656	28	02.2	28 01	-04.4	09 22	-01.1
46023	34.3N	120.7W	672	29	15.9	26 23	10.0	17 14	13.1	693	29	15.4	09 20	12.3	24 09	14.0	693	29	02.0	26 23	-04.3	17 14	-00.9
46025	33.6N	119.0W	460	20	17.5	20 00	12.3	17 15	14.9	460	20	17.1	07 22	15.4	20 03	16.1	461	20	01.5	20 00	-03.5	17 14	-01.2
46026	37.8N	122.7W	690	29	15.2	03 22	08.2	02 17	11.2	690	29	13.7	19 22	11.0	29 14	12.2	691	29	02.9	27 22	-03.8	02 17	-01.0
46027	41.8N	124.4W	688	29	14.4	03 04	05.1	22 14	09.4	688	29	11.3	06 21	09.8	23 06	10.6	691	29	03.9	03 04	-05.1	22 14	-01.2
46028	35.8N	121.7W	693	29	14.7	27 23	09.7	21 15	12.3	694	29	14.2	05 00	12.4	26 13	13.1	694	29	01.7	27 23	-03.2	21 15	-00.8
51001	23.4N	162.3W	694	29	25.6	12 04	18.8	03 14	22.3	694	29	25.8	12 04	22.6	24 18	23.4	694	29	00.4	16 03	-04.9	03 14	-01.2
BURL1	28.5N	089.2W	201	09	20.6	27 04	05.2	29 15	12.8														
CSBF1	29.7N	085.4W	672	29	20.8	19 16	07.0	08 10	12.8														
DPLN6	42.6N	079.5W	369	20	14.9	13 20	00.0	03 23	04.9														
DISW3	47.1N	090.7W	242	15	06.8	22 22	00.0	10 13	01.0														
GLLN6	43.5N	076.3W	377	19	09.1	23 21	00.0	03 05	02.3														
ROAM4	47.9N	089.3W	243	14	02.6	16 08	00.0	10 16	00.8														
SPIO1	41.7N	082.8W	416	21	12.1	23 20	00.0	04 13	03.4														
SGNW3	43.8N	087.7W	383	20	09.6	23 19	00.0	03 08	02.3														
SISW1	48.3N	122.9W	692	29	12.7	08 03	03.6	17 12	07.1														
SRST2	29.7N	094.1W	409	18	20.6	16 18	00.1	29 10	12.8														
WPOW1	47.7N	122.4W	594	26	12.3	08 23	02.5	17 15	07.3														

FEBRUARY 1984			PRESSURE (MB)							WIND SPEEDS (KNOTS)				MEAN WIND SPEED (KNOTS)								
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	MAX	DY HR	DIR	N	NE	E	SE	S	SW	W	NW	TOTAL
41001	34.9N	072.9W	696	29	1033.4	10 16	997.8	28 18	1017.5	695	43	06 20	230	12.1	8.4	10.6	17.1	19.6	20.6	21.5	17.8	17.6
41002	32.3N	075.3W	694	29	1032.6	10 15	1001.7	05 08	1018.0	681	33	06 19	270	9.8	8.4	10.5	13.3	14.0	13.5	17.7	11.9	13.6
41006	29.3N	077.3W	695	29	1029.8	09 15	1004.9	28 08	1017.4	693	34	29 01	260	9.4	8.7	13.5	15.7	17.2	15.0	20.6	12.7	14.1
42001	25.9N	089.7W	696	29	1029.3	07 17	1001.0	27 07	1017.2	695	37	28 07	320	14.7	12.4	13.0	14.3	12.4	14.1	19.3	20.2	15.0
42002	26.0N	093.5W	694	29	1030.8	29 16	1001.0	26 22	1018.1	688	31	27 15	300	11.9	9.3	11.4	11.6	7.4	11.6	17.2	17.0	12.4
42007	30.1N	088.9W	696	29	1031.9	07 16	994.7	27 04	1017.3	335	31	06 04	340	13.5	11.0	10.0	10.6	6.0	8.5	11.8	9.0	10.6
42008	28.7N	095.3W	693	29	1032.8	29 16	998.8	26 19	1018.4	687	40	27 15	300	17.1	11.2	10.7	11.1	9.9	9.7	11.6	17.4	12.8
42011	29.6N	093.5W	693	29	1031.4	06 16	996.4	26 22	1017.6	689	40	12 15	320	14.6	14.0	12.7	13.6	11.0	9.1	13.7	19.7	13.8
44003	40.8N	068.5W	695	29	1036.1	10 16	989.2	24 20	1014.2	692	29	06 06	250	11.7	7.5	10.1	13.2	12.1	14.6	15.4	15.2	13.5
44004	38.5N	070.7W	696	29	1034.4	10 15	990.9	29 03	1015.2	694	34	29 03	230	8.6	7.7	9.2	14.1	14.1	14.4	17.4	13.6	14.1
44005	42.7N	068.3W	695	29	1035.2	10 14	986.6	24 21	1013.6	694	29	06 05	230	12.3	15.0	14.3	11.8	13.3	16.1	12.8	15.3	14.1
44007	43.5N	070.1W	668	29	1034.7	10 12	982.9	29 08	1014.2	662	28	28 23	070	11.0	10.7	10.3	7.0	11.9	10.8	10.7	12.5	11.0
44008	40.5N	069.4W	686	29	1035.9	10 15	989.4	29 04	1014.6	679	29	06 03	240	9.1	9.3	12.6	12.2	12.6	14.3	15.0	13.2	13.0
44009	38.5N	074.6W	677	29	1031.8	08 14	989.0	28 22	1016.2	672	33	29 04	230	9.0	7.6	12.4	11.8	13.6	14.2	14.9	16.0	13.4
44010	36.9N	075.7W	340	15	1024.8	27 13	988.7	28 21	1011.3	256	31	28 00	090	7.0	15.0	12.6	9.1	11.4	16.5	14.7	11.7	12.7
46001	56.3N	148.3W	682	29	1012.1	05 09	961.1	12 17	991.5	679	34	04 09	210	11.2	13.0	14.7	13.9	15.9	16.8	14.9	15.2	15.1
46002	42.5N	130.3W	691	29	1031.0	02 04	993.0	09 05	1015.0	695	38	24 10	270	11.1	12.3	6.1	17.7	17.1	15.1	19.1	16.0	16.2
46003	51.9N	155.7W	232	29	1016.5	09 00	958.9	12 03	995.2	232	31	01 21	260	18.5	14.8	19.2	15.5	18.6	17.6	16.9	18.5	17.7
46004	51.0N	136.0W	598	27	1021.9	02 10	982.0	29 19	1004.8													
46005	46.1N	131.0W	696	29	1031.1	02 19	980.0	24 05	1010.8													
46006	40.7N	137.7W	696	29	1032.4	21 20	993.3	07 04	1014.9	695	47	08 16	260	12.9	5.2	8.6	14.4	21.1	20.9	22.3	22.7	20.5
46010	46.2N	124.2W	680	29	1030.6	02 18	996.3	24 17	1016.5	678	29	09 13	180	9.7	6.9	12.2	10.9	17.4	14.1	13.0	13.8	13.7
46011	34.9N	120.9W	421	18	1026.3	17 19	1015.9	23 01	1020.8	420	30	25 06	320	13.4	8.7	4.2	5.4	9.4	5.1	9.7	17.1	14.1
46012	37.4N	122.7W	196	11	1024.9	11 16	1016.4	02 01	1018.8	222	17	10 03	290	6.7	2.8	3.6	5.5	5.5	5.4	7.5	6.8	06.0
46013	38.2N	123.3W	693	29	1029.0	17 19	1015.6	13 21	1022.1	644	24	14 04	300	3.5	4.9	8.3	8.6	7.8	8.8	10.1	12.9	10.2
46014	39.2N	124.0W	694	29	1028.5	17 19	1012.2	13 15	1020.9	674	29	15 18	150	6.7	4.2	4.8	12.6	9.9	8.7	11.6	11.0	09.9
46016	63.3N	170.3W	231	29	1047.2	26 09	992.4	12 09	1017.6	230	35	28 12	050	16.3	19.5	14.4	8.2	11.0				17.2
46017	60.3N	172.3W	230	29	1044.7	26 12	989.0	12 18	1015.5	230	26	20 21	080	11.8	15.1	18.8	8.0	9.7	7.8	4.0	3.9	13.6
46022	40.8N	124.5W	667	28	1029.0	17 19	1008.2	13 13	1019.9	647	35	13 09	180	10.9	5.4	6.4	9.7	16.7	12.0	12.1	12.7	13.0
46023	34.3N	120.7W	693	29	1025.6	17 18	1015.4	02 01	1019.9	688	35	25 12	340	18.1	5.0	7.2	9.0	7.2	10.0	8.6	19.1	17.9
46025	33.6N	119.0W	461	20	1022.9	17 19	1014.6	02 00	1018.5	436	27	17 02	310	5.2	4.2	3.8	3.9	4.3	3.5	7.1	10.3	07.7
46026	37.8N	122.7W	690	29	1028.3	17 19	1015.6	13 23	1021.6	657	28	16 11	280	5.2	5.6	9.0	7.0	9.5	7.5	9.4	12.3	09.8
46027	41.8N	124.4W	684	29	1029.7	17 19	1007.6	13 11	1019.9	680	35	09 06	170	13.8	4.7	7.6	13.9	15.2	11.7	14.4	8.9	13.2
46028	35.8N	121.7W	694	29	1027.2	17 19	1016.2	02 01	1021.5	680	24	22 00	310	7.2	2.8	4.3	5.4	5.0	5.6	6.9	13.8	10.8
51001	23.4N	162.3W	694	29	1023.3	20 21	1009.4	02 02	1018.9	681	21	05 08	330	11.8	10.0	11.2	8.6	4.1	11.3	12.7	14.8	11.2
BURL1	28.5N	089.2W	202	09	1028.2	29 16	998.5	27 04	1014.6	202	39	27 19	260	15.5	13.2	22.1	20.0	8.5	17.8	21.6	14.9	18.0
CSBF1	29.7N	085.4W	690	29	1032.1	08 14	1000.2	27 10	1018.5	691	34	28 14	280	3.7	2.9	4.8	4.2	4.0	6.7	12.9	6.6	05.8
DPLN6	42.6N	079.5W	685	29	1033.9	08 16	990.5	26 22	1015.6	684	32	28 19	030	10.7	13.1	3.9	9.8	6.9	12.8	13.1	14.8	11.1
DISW3	47.1N	090.7W	695	29	1034.1	07 17	995.6	23 10	1014.7	694	31	02 14	070	12.3	11.8	7.4	3.5	5.9	9.1	8.2	9.4	09.2
GLLN6	43.5N	076.3W	694	29	1031.3	08 15	984.0	29 06	1015.0	694	31	03 09	160	7.8	10.4	5.2	13.6	14.1	10.8	14.5	12.1	11.7
ROAM4	47.9N	089.3W	696	29	1033.6	07 17	994.8	03 07	1015.8	687	36	05 11	030	11.9	16.9	10.8	15.8	10.2	12.9	15.3	8.8	13.8
SPIO1	41.7N	082.8W	692	29	1036.4	08 13	999.5	26 19	1016.7	694	33	29 03	340	10.6	11.7	9.4	10.0	11.6	11.7	12.3	14.2	11.6
SGNW3	43.8N	087.7W	657	28	1033.9	08 04	999.0	03 06	1014.6	692	41	28 13	020	16.6	14.3	8.1	9.2	10.4	7.8	8.5	12.7	11.2
SISW1	48.3N	122.9W	693	29	1032.0	02 19	996.5	12 14	1016.0	692	40	11 16	150	6.1	4.5	10.5	17.6	11.8	6.0	9.8	5.2	12.9
SRST2	29.7N	094.1W	413	18	1030.3	29 15	996.1	26 20	1015.5	413	28	27 17	310	9.9	7.5	10.2	13.2	8.7	10.1	9.8	10.5	10.5
WPOW1	47.7N	122.4W	595	26	1032.5	02 19	998.9	13 14	1016.9	594	29	10 01	190	8.0	5.0	3.1	5.9	10.6	9.0	1.9	3.2	08.3

FEBRUARY 1984			WAVE HEIGHTS (METERS)				FREQUENCY OF WAVE HEIGHTS (%)							
BUOY	LAT	LONG	OBS	MAX	DY HR	MEAN	<1M	1-1.5M	2-2.5M	3-3.5M	4-5.5M	6-7.5M	8-9.5M	>9.5M
41001	34.9N	072.9W	694	9.5	29 03	2.6	4.3	35.4	23.1	16.2	14.4	4.3	2.0	
41002	32.3N	075.3W	693	8.5	29 02	2.4	2.4	43.2	23.2	15.8	9.5	4.6	1.0	
41006	29.3N	077.3W	693	7.5	29 01	2.3		37.0	37.0	16.8	5.7	3.1		
42001	25.9N	089.7W	693	6.5	28 03	1.5	17.1	57.2	18.6	1.4	4.3	1.1		
42002	26.0N	093.5W	691	6.0	27 23	1.4	8.6	72.3	11.8	3.1	3.6	0.2		
42007	30.1N	088.9W	467	3.0	27 03	0.7	67.6	29.5	1.9	0.8				
44003	40.8N	068.5W	693	7.0	29 20	2.5	1.0	25.6	36.6	21.3	13.8	1.4		
44004	38.5N	070.7W	682	7.0	15 17	2.6	6.3	23.7	28.8	17.8	18.7	4.3		
44005	42.7N	068.3W	693	6.5	29 03	2.3	1.7	30.3	41.2	13.1	13.1	0.4		
44007	43.5N	070.1W	591	6.5	29 03	1.3	30.7	46.1	14.7	4.5	3.0	0.6		
44008	40.5N	069.4W	657	7.0	29 12	2.2	4.4	30.8	35.0	17.0	11.4	1.2		
44010	36.9N	075.7W	311	3.0	28 01	0.9	54.3	32.1	12.2	1.2				
46001	56.3N	148.3W	655	9.5	02 11	3.8		2.5	19.6	29.7	36.3	9.6	1.9	
46002	42.5N	130.3W	694	13.5	24 12	4.1		6.4	12.1	30.1	37.8	7.3	3.6	2.4
46003	51.9N	155.7W	231	8.5	02 00	4.1			14.2	32.4	40.2	12.1	0.8	
46004	51.0N	136.0W	684	9.5	15 06	4.4			6.8	25.1	54.0	10.2	3.6	
46005	46.1N	131.0W	689	9.0	24 05	4.1		5.9	7.6	30.1	42.8	10.7	2.6	
46006	40.7N	137.7W	689	9.0	08 23	4.1		5.9	11.4	23.8	42.5	14.2	2.0	
46010	46.2N	124.2W	643	9.0	24 17	3.1		15.3	20.8	36.3	24.5	2.0	0.7	
46011	34.9N	120.9W	410	7.0	25 13	2.8		10.4	43.9	27.8	15.8	1.9		
46012	37.4N	122.7W	218	5.0	10 02	1.5	9.6	62.8	22.0	2.7	2.7			
46013	38.2N	123.3W	689	7.5	25 03	2.6	2.6	22.7	31.7	20.7	20.1	1.8		
46014	39.2N	124.0W	688	9.0	24 22	2.8	3.3	17.0	33.7	23.2	18.8	2.3	1.4	
46022	40.8N	124.5W	664	12.0	24 22	3.3	0.7	14.6	20.3	32.2	27.8	1.9	0.7	1.5
46023	34.3N	120.7W	690	7.0	25 19	2.4	0.1	32.0	32.6	22.8	10.8	1.4		
46025	33.6N	119.0W	438	3.5	17 02	1.3	26.9	43.6	27.8	1.5				
46026	37.8N	122.7W	683	5.0	25 02	1.8	11.5	35.4	33.6	15.8	3.5			
46027	41.8N	124.4W	123	0.0	00 00	0.0								60.1
46028	35.8N	121.7W	691	8.5	25 07	2.6	0.4	28.7	32.4	18.3	17.8	1.8	0.2	
51001	23.4N	162.3W	690	6.0	03 08	2.6		11.4	56.6	20.4	11.1	0.2		

FEBRUARY 1984			TOTAL FREQUENCY OF WIND SPEEDS (%)							TOTAL FREQUENCY OF WIND DIRECTIONS (%)							
BUOY	LAT	LONG	CALM	<4KT	4-10KT	11-21KT	22-33KT	34-47KT	>47KT	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W		3.9	24.2	39.0	27.9	5.0		10.7	4.3	4.5	18.0	11.4	15.3	16.3	19.4
41002	32.3N	075.3W		9.1	30.5	43.5	16.9			10.1	2.6	4.4	20.4	12.4	10.3	22.8	16.9
41006	29.3N	077.3W		3.0	30.2	54.3	12.4	0.1		9.1	15.6	17.3	12.6	4.4	8.8	18.1	14.1
42001	25.9N	089.7W		2.9	13.8	72.5	10.4	0.4		12.2	11.8	17.7	28.2	6.7	2.3	2.0	19.1
42002	26.0N	093.5W		3.2	33.9	56.0	7.0			15.7	9.0	14.4	35.8	3.3	0.9	2.6	18.2
42007	30.1N	088.9W		4.5	48.1	45.4	2.1			15.6	6.2	30.1	23.4	4.5	3.7	8.1	8.4
42008	28.7N	095.3W		3.5	39.4	46.7	9.3	1.0		15.4	5.9	21.6	19.8	12.8	3.0	5.5	16.0
42011	29.6N	093.5W	0.3	3.2	33.1	49.8	12.0	1.9		18.2	7.9	7.5	27.3	12.1	9.9	4.4	12.8
44003	40.8N	068.5W		5.2	27.9	55.9	11.0			9.6	4.8	3.9	12.8	16.4	11.9	20.8	19.7
44004	38.5N	070.7W		3.9	26.8	56.5	12.5	0.3		5.8	3.2	7.3	9.5	13.6	7.8	29.3	23.5
44005	42.7N	068.3W		4.8	24.1	59.5	11.7			7.7	11.2	8.6	8.8	16.6	14.4	13.6	19.1
44007	43.5N	070.1W		5.4	40.0	52.0	2.6			24.5	10.8	8.0	3.7	12.5	13.4	12.0	14.9
44008	40.5N	069.4W		4.4	26.7	61.1	7.8			7.6	4.2	7.9	11.4	15.1	12.0	22.1	19.8
44009	38.5N	074.6W	1.0	4.0	32.9	50.4	12.6			6.8	6.5	12.2	9.7	13.7	13.6	12.8	24.9
44010	36.9N	075.7W		2.7	42.6	43.0	11.7			4.4	12.3	8.2	12.6	14.2	11.7	19.6	17.0
46001	56.3N	148.3W		2.4	22.4	59.5	15.5	0.3		3.8	11.0	11.4	6.8	8.9	29.1	17.5	9.6
46002	42.5N	130.3W		2.9	15.7	63.0	17.1	1.3		6.9	5.0	1.1	4.6	27.1	23.5	21.0	10.9
46003	51.9N	155.7W		0.9	9.5	63.8	25.9			12.9	2.7	5.2	5.5	5.7	12.6	32.3	23.1
46006	40.7N	137.7W		1.0	8.2	46.8	40.0	4.0		1.0	0.5	1.3	11.0	17.0	32.9	23.2	13.1
46010	46.2N	124.2W		2.5	29.5	57.2	10.8			4.9	4.0	23.7	9.3	30.2	11.0	11.2	5.7
46011	34.9N	120.9W		6.9	22.6	58.1	12.4			26.3	5.2	3.9	2.4	1.9	3.0	3.9	53.4
46012	37.4N	122.7W		26.1	61.3	12.6				22.2	3.9	5.2	14.9	12.7	6.7	9.7	22.7
46013	38.2N	123.3W		12.7	42.1	43.2	2.0			2.9	2.8	10.6	17.2	5.6	4.7	17.7	38.5
46014	39.2N	124.0W		18.4	39.5	37.1	5.0			9.6	5.7	8.7	27.1	11.7	6.0	9.5	21.7
46016	63.3N	170.3W		0.9	16.3	52.6	27.6	0.4		8.0	58.8	26.3	6.5	0.3			
46017	60.3N	172.3W		5.2	28.7	57.8	6.3			43.8	45.9	6.2	0.4	1.6	0.5	0.3	1.2
46022	40.8N	124.5W		6.3	35.2	46.8	11.1	0.5		13.3	3.0	2.0	16.3	38.0	10.4	8.2	8.8
46023	34.3N	120.7W		2.5	15.8	44.5	37.1	0.1		20.3	0.6	1.3	2.9	1.2	0.1	2.6	70.9
46025	33.6N	119.0W		21.8	54.1	22.5	1.6			7.2	5.8	3.2	3.6	3.7	4.8	29.5	42.3
46026	37.8N	122.7W		14.9	39.3	44.6	1.2			5.3	4.5	16.1	6.9	11.2	5.8	12.3	37.9
46027	41.8N	124.4W	4.1	7.2	40.7	36.2	15.1	0.7		13.1	3.2	8.1	32.7	25.3	7.9	3.5	6.0
46028	35.8N	121.7W		10.0	44.0	43.1	2.9			6.7	1.6	2.9	4.2	3.6	3.5	15.8	61.7
51001	23.4N	162.3W		3.1	41.3	55.7				5.4	15.4	62.7	4.8	0.7	1.2	1.2	8.5
BURL1	28.5N	089.2W		1.0	20.8	44.1	27.2	6.9		7.5	5.3	13.5	4.0	7.4	14.2	31.1	17.0
CSBF1	29.7N	085.4W	8.2	40.1	47.0	9.1	3.6	0.1		11.4	16.3	27.7	7.4	4.1	5.2	14.5	13.5
DBLN6	42.6N	079.5W	2.5	10.7	41.8	39.0	6.5			3.4	11.4	4.9	11.3	16.9	32.9	14.8	4.3
DISW3	47.1N	090.7W	4.6	15.3	49.0	31.7	4.0			13.6	20.0	8.0	3.5	15.9	23.5	7.8	7.8
GLLN6	43.5N	076.3W	2.3	8.6	40.9	40.8	9.7			10.4	16.2	6.6	11.9	19.7	9.1	14.1	12.0
ROAM4	47.9N	089.3W	1.5	6.4	31.0	47.9	14.1	0.6		19.0	27.2	11.2	4.5	1.5	12.8	17.9	5.9
SPIO1	41.7N	082.8W	1.9	7.3	38.3	47.7	6.6			6.1	8.8	8.2	10.3	17.4	22.4	14.2	12.5
SGNW3	43.8N	087.7W	2.6	10.7	42.2	38.7	4.9	3.5		15.5	10.2	6.2	6.1	19.3	16.3	12.9	13.5
STSW1	48.3N	122.9W	5.1	14.3	30.5	36.6	16.8	1.9		6.1	5.1	8.5	48.7	10.7	3.6	9.8	7.7
SRST2	29.7N	094.1W	0.2	2.7	53.8	41.2	2.4			19.7	4.8	4.4	21.9	16.1	6.7	5.8	20.6
WPOW1	47.7N	122.4W	7.9	21.9	46.0	27.6	4.5			15.4	11.2	2.4	16.1	43.6	8.5	2.6	0.4

FEBRUARY 1984			% FREQUENCY OF WIND SPEEDS (<4 KTS)								% FREQUENCY OF WIND SPEEDS (4-10 KTS)								% FREQUENCY OF WIND SPEEDS (11-21 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W	0.8	0.8	0.9	0.5	0.3	<.05	0.1	0.4	3.6	2.4	2.0	4.3	1.4	3.7	3.3	3.4	6.2	1.1	1.0	4.7	5.0	5.1	4.0	9.8
41002	32.3N	075.3W	0.7	0.3	0.4	1.4	1.2	1.2	2.4	1.4	4.1	1.5	1.9	7.1	3.2	1.9	5.1	5.9	5.2	0.8	2.1	9.4	5.7	6.0	5.5	8.7
41006	29.3N	077.3W	0.5	0.6	0.5	<.05	0.3	0.2	0.4	0.5	5.7	10.5	3.4	2.4	0.4	1.6	2.0	4.1	2.9	4.4	13.4	9.1	2.3	6.2	7.1	8.8
42001	25.9N	089.7W	0.1	0.6	0.6	0.2	0.8	0.1	0.1	0.3	2.5	1.9	2.9	2.2	1.7	1.1	0.1	1.4	8.5	9.1	14.2	25.5	4.0	0.1	0.9	10.3
42002	26.0N	093.5W	0.5	0.2	0.5	0.8	0.7			0.3	6.2	5.2	4.9	11.0	1.8	0.3	0.8	3.8	8.1	3.5	8.9	23.9	0.9	0.6	1.1	9.0
42007	30.1N	088.9W	0.5	0.1	0.8	0.6	1.4	0.1	0.3	0.7	5.0	2.5	14.7	11.9	2.3	2.8	3.4	5.6	8.1	3.7	14.6	10.9	0.7	0.9	4.4	2.1
42008	28.7N	095.3W		0.7	1.2	1.1	0.3		0.3	0.3	3.3	2.9	9.6	7.9	7.1	1.8	3.1	3.6	7.7	2.4	10.6	10.6	5.3	1.2	1.4	7.6
42011	29.6N	093.5W	0.5	0.4	0.3	0.4	0.6	0.4	0.3		5.8	3.1	2.5	4.8	5.3	6.3	1.6	3.7	8.8	2.9	4.5	20.0	5.7	3.0	1.7	3.2
44003	40.8N	068.5W	0.6	0.7	0.5	0.5	0.3	0.8	0.9	0.8	3.8	3.1	1.3	3.4	5.1	3.6	3.6	4.0	5.1	1.0	2.0	7.2	11.1	4.6	12.0	12.9
44004	38.5N	070.7W	0.6	0.7	0.5			0.8	0.5	0.8	3.5	2.1	4.0	2.0	3.1	2.5	4.0	5.6	1.2	0.3	2.6	7.1	9.6	2.7	17.0	15.9
44005	42.7N	068.3W	0.3	0.6	0.5	0.4	1.5	0.5	0.1	0.9	2.5	2.2	3.0	3.7	3.2	2.2	4.6	3.0	4.9	6.4	3.0	4.9	11.7	8.9	8.3	11.4
44007	43.5N	070.1W	0.5	0.5	2.0	0.4	0.4	0.6	0.7	0.5	9.1	4.9	2.6	2.9	5.2	6.0	5.4	3.9	15.0	5.1	2.1	0.5	6.5	6.9	5.9	10.0
44008	40.5N	069.4W	0.8	0.1	0.8	0.7	0.1	0.5	1.0	0.4	4.2	2.7	1.7	2.1	3.6	3.5	3.6	4.9	2.5	1.5	4.2	8.5	11.3	5.5	13.7	13.7
44009	38.5N	074.6W	0.4	1.1	0.5	0.6	0.2	0.2	0.3	0.7	4.5	3.7	4.8	3.6	2.6	3.4	4.7	5.5	1.9	1.6	5.5	5.3	10.8	8.8	4.5	11.9
44010	36.9N	075.7W				0.4		0.4	1.1	0.9	4.1	3.8	4.7	8.7	4.8	2.4	6.2	7.9	0.3	5.4	2.3	3.5	9.4	4.4	10.6	7.0
46001	56.3N	148.3W	0.3	0.1	0.1	<.05		0.5	0.6	0.7	1.7	4.9	3.5	2.4	1.7	3.0	2.4	3.2	1.7	5.4	6.0	4.9	5.4	19.6	13.5	3.0
46002	42.5N	130.3W	0.5	0.2	0.3		0.7	0.4	0.5	0.4	2.1	1.0	0.8	0.5	2.7	3.8	2.4	2.3	4.2	3.8		3.5	17.3	17.4	10.5	6.4
46003	51.9N	155.7W				0.9					1.5	0.6	0.3	0.5		0.9	3.3	2.3	6.8	2.0	3.6	2.4	4.5	8.7	22.8	12.9
46006	40.7N	137.7W	0.1	0.1	0.1	0.1	0.1	0.3			0.4	0.4	0.8	2.2	1.9	1.7	0.4	0.6	0.4		0.4	7.4	4.8	16.5	12.1	5.3
46010	46.2N	124.2W	0.3	0.1	0.3	0.2	0.5	0.2	0.7	0.3	2.2	3.5	8.1	4.5	3.0	3.2	3.1	1.9	2.4	0.3	15.3	4.4	19.6	6.2	6.6	2.5
46011	34.9N	120.9W	0.8	1.0	1.9	0.5	0.2	1.0	0.5	1.0	5.4	2.4	2.0	1.8	0.7	2.0	1.4	6.9	20.1	1.7		0.1	1.1		2.0	33.2
46012	37.4N	122.7W	5.4	2.6	2.5	4.4	2.4	2.8	2.0	3.0	12.4	1.4	2.7	9.6	9.9	3.9	5.3	16.1	4.4			0.9	0.5	0.9	2.4	3.6
46013	38.2N	123.3W	1.5	1.1	1.6	1.6	0.7	1.0	2.6	2.7	1.4	1.3	5.8	11.2	3.6	2.0	6.2	10.5		0.3	3.2	4.4	1.2	1.7	8.9	23.3
46014	39.2N	124.0W	2.7	2.0	3.4	2.6	1.9	1.6	1.9	2.3	5.3	3.7	5.0	8.3	4.2	1.8	1.7	9.3	1.6		0.3	12.4	5.5	7.6	5.9	8.9
46016	63.3N	170.3W		0.9							1.1	4.8	7.4	5.0					5.5	29.6	15.7	1.5	0.3			
46017	60.3N	172.3W	3.0	1.3	0.4					0.4	17.0	8.0	0.9	0.4	0.8	0.5	0.3	0.8	22.3	32.9	1.7		0.9			
46022	40.8N	124.5W	0.6	0.7	0.4	0.8	0.9	1.0	1.2	0.8	5.0	2.1	1.4	10.7	8.2	3.4	2.5	2.0	7.7	0.2	0.3	4.6	18.4	5.6	4.2	5.8
46023	34.3N	120.7W	0.4	0.1	0.4	0.3	0.1		0.3	0.7	4.6	0.4	0.5	1.6	0.9	0.1	1.3	6.5	6.9	0.1	0.4	1.1	0.1		1.1	34.8
46025	33.6N	119.0W	2.1	2.6	1.7	1.5	1.4	2.5	6.8	3.2	4.7	3.2	1.5	2.1	2.3	2.2	17.8	20.4	0.4						4.5	17.5
46026	37.8N	122.7W	1.8	1.9	1.5	2.1	1.2	1.2	2.5	2.6	3.1	1.8	8.0	3.4	5.9	3.1	4.6	9.4	0.3	0.8	6.6	1.4	3.8	1.5	4.9	25.2
46027	41.8N	124.4W	0.3	0.7	1.2	1.9	1.2	0.7		1.2	5.6	2.4	5.4	11.8	7.4	3.4	1.5	2.9	5.6	<.05	1.3	12.6	11.7	2.2	1.1	1.7
46028	35.8N	121.7W	1.7	1.1	1.3	0.8	0.6	0.7	1.8	2.0	3.5	0.5	1.6	3.3	3.1	2.8	12.5	16.7	1.6						1.5	40.0
51001	23.4N	162.3W	0.1	1.2	1.0	0.2	0.4	0.1			2.3	7.9	24.7	3.6	0.3	0.2	0.4	1.9	3.0	6.2	37.0	1.0		0.9	0.9	6.6
BURL1	28.5N	089.2W						0.5	0.4	0.1	0.4	0.5	1.6	2.0	5.8	1.7	4.3	4.5	6.8	4.8	3.7	0.1	1.2	7.9	10.1	9.3
CSBF1	29.7N	085.4W	6.6	9.9	7.9	4.4	2.6	1.8	1.4	5.5	4.7	6.3	19.4	1.8	0.9	2.4	6.4	5.1	0.1		0.4	1.2	0.6	0.7	3.5	2.6
DBLN6	42.6N	079.5W	0.7	1.5	2.2	1.3	2.3	0.7	1.6	0.4	1.6	4.4	2.5	5.6	11.8	12.3	3.0	0.8	0.5	2.9	0.2	4.3	2.9	17.6	8.8	1.8
DISW3	47.1N	090.7W	1.0	1.9	1.9	0.9	3.0	2.3	2.6	1.6	4.5	7.9	4.5	2.4	11.9	12.3	2.6	2.9	7.2	7.8	1.0	0.1	1.0	4.9	2.6	3.1
GLLN6	43.5N	076.3W	0.9	1.7	1.6	0.9	0.8	0.5	1.0	1.2	7.7	8.0	4.7	3.8	4.4	4.7	3.5	4.2	1.8	5.4	0.3	5.2	12.5	3.4	6.7	5.6
ROAM4	47.9N	089.3W	1.7	1.3	0.5	0.5	0.2	0.8	0.7	0.5	6.4	6.4	5.6	0.5	0.7	3.7	4.4	3.2	10.0	10.7	4.6	2.4	0.6	7.9	9.5	2.1
SPIO1	41.7N	082.8W	1.1	1.2	1.2	1.2	0.7	0.5	0.8	0.7	2.7	2.9	3.7	5.8	6.9	8.4	4.6	3.4	1.5	4.0	3.2	3.0	9.3	12.5	8.1	6.1
SGNW3	43.8N	087.7W	1.3	1.1	1.7	1.6	1.3	1.6	1.8	0.2	4.8	3.6	2.5	1.6	7.6	10.4	7.0	4.7	4.3	3.2	1.6	2.9	10.3	4.3	4.2	8.0
STSW1	48.3N	122.9W	1.9	1.3	0.5	3.1	1.6	1.1	2.6	2.2	3.4	3.5	3.6	7.5	3.6	1.9	2.3	4.6	0.8	0.2	4.3	21.5	3.9	0.6	4.4	0.9
SPST2	29.7N	094.1W	0.9	0.5		0.2		0.2	0.2	0.5	9.8	3.5	2.8	5.5	12.8	3.9	3.3	12.0	9.0	0.8	1.6	15.6	2.6	2.3	2.2	7.1
WPOW1	47.7N	122.4W	2.5	4.9	1.2	5.0	5.4	2.2	0.4	0.3	7.9	4.5	1.1	8.6	19.0	2.5	2.1	0.1	5.0	1.8		2.5	15.0	3.4		

FEBRUARY 1984			% FREQUENCY OF WIND SPEEDS (22- 33 KTS)								% FREQUENCY OF WIND SPEEDS (34-47 KTS)								% FREQUENCY OF WIND SPEEDS (>47 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W	0.1		0.6	6.4	4.4	7.4	7.5	5.5				0.1	0.3	3.0	1.4	0.2								
41002	32.3N	075.3W				2.5	2.2	1.3	9.8	1.0																
41006	29.3N	077.3W				1.0	1.4	0.8	8.5	0.6							0.1									
42001	25.9N	089.7W	1.1	0.7		0.3	0.3	0.9	0.9	6.7								0.4								
42002	26.0N	093.5W	0.9			0.1			0.8	5.1																
42007	30.1N	088.9W	2.0							0.1																
42008	28.7N	095.3W	4.4	0.2	0.1	0.1	0.1		0.6	3.5								1.0								
42011	29.6N	093.5W	3.1	1.5	0.3	1.7	0.4	0.2	0.7	4.2							0.1	1.8								
44003	40.8N	068.5W	0.1		0.1	1.6		0.9	4.2	2.0																
44004	38.5N	070.7W	0.5	0.2	0.1	0.5	0.7	1.6	7.9	1.1						0.3										
44005	42.7N	068.3W	0.1	2.0	2.0	0.2	0.1	0.9	0.5	3.8																
44007	43.5N	070.1W		0.3	1.3		0.4	<.05		0.5																
44008	40.5N	069.4W			1.1	<.05		2.4	3.5	0.7																
44009	38.5N	074.6W		<.05	1.3	0.1		1.2	3.3	6.7																
44010	36.9N	075.7W		3.1	1.2			4.5	1.8	1.2																
46001	56.3N	148.3W	0.1	0.6	1.8	1.4	2.2	5.7	0.9	2.7						0.3										
46002	42.5N	130.3W				0.5	6.4	2.0	6.4	1.8							1.3	<.05								
46003	51.9N	155.7W	4.6		1.3	1.7	1.2	3.0	6.1	7.9																
46006	40.7N	137.7W	0.1			1.3	9.8	13.9	8.7	6.2					0.3	0.6	2.1	1.1								
46010	46.2N	124.2W	0.1		0.1	0.2	7.1	1.3	0.9	1.0																
46011	34.9N	120.9W								12.4																
46012	37.4N	122.7W																								
46013	38.2N	123.3W								2.0																
46014	39.2N	124.0W				3.7	0.1			1.2																
46016	63.3N	170.3W	1.4	23.2	3.3							0.4														
46017	60.3N	172.3W	1.5	3.6	3.2																					
46022	40.8N	124.5W				0.2	10.1	0.4	0.3	0.2					0.5											
46023	34.3N	120.7W	8.2							28.8	0.1							<.05								
46025	33.6N	119.0W							0.3	1.3																
46026	37.8N	122.7W				<.05	0.3		0.2	0.8																
46027	41.8N	124.4W	1.6		0.1	6.5	4.3	1.5	0.9	0.2					0.7											
46028	35.8N	121.7W								2.9																
51001	23.4N	162.3W																								
BURL1	28.5N	089.2W	0.4		6.8	0.7	0.4	3.6	12.3	3.1			1.4	1.1		0.5	4.0									
CSBF1	29.7N	085.4W						0.3	3.0	0.3							0.1									
DBLN6	42.6N	079.5W	0.7	2.7		0.1		2.2	1.5	1.4																
DISW3	47.1N	090.7W	1.0	2.3	0.5					0.2																
GLLN6	43.5N	076.3W		1.2		2.1	2.1	0.5	2.8	1.0																
ROAM4	47.9N	089.3W	0.9	8.2	0.4	1.0		0.4	3.3			0.6														
SPIO1	41.7N	082.8W	0.9	0.7	0.1	0.4	0.5	1.0	0.8	2.3																
SGNW3	43.8N	087.7W	2.8	1.1	0.4					0.7	2.3	1.2														
STSW1	48.3N	122.9W			0.1	14.7	1.6		0.4					1.9												
SPST2	29.7N	094.1W				0.5	0.7	0.2		1.0																
WPOW1	47.7N	122.4W					4.1	0.4																		

MARCH 1984			AIR TEMPERATURE (DEG C)							SEA TEMPERATURE (DEG C)							AIR-SEA TEMPERATURE DIFFERENCE (DEG C)						
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
41001	34.9N	072.9W	740	31	21.7	29 07	02.6	01 16	13.9	740	31	21.4	07 03	17.6	10 04	19.0	740	31	01.6	29 07	-15.8	01 18	-05.1
41002	32.3N	075.3W	593	31	23.7	29 05	08.8	01 18	17.4	593	31	22.7	17 16	19.7	20 11	21.1	593	31	02.8	28 20	-12.5	01 18	-03.7
41006	29.3N	077.3W	741	31	24.9	29 06	13.3	01 12	20.3	741	31	24.3	07 16	22.3	05 12	23.1	741	31	01.7	29 06	-09.9	01 12	-02.7
42001	25.9N	089.7W	497	31	24.2	05 20	12.7	01 00	20.0	497	31	23.5	20 00	20.2	08 05	21.5	541	31	01.9	28 12	-08.6	01 00	-01.4
42002	26.0N	093.5W	671	31	23.5	28 12	12.2	01 01	19.9	671	31	22.8	16 21	19.1	09 09	21.0	672	31	02.6	28 12	-08.7	01 01	-01.0
42003	26.0N	085.9W	239	11	28.0	28 22	21.0	21 23	25.0	239	11	27.1	26 20	25.3	26 03	26.2	239	11	02.0	26 02	-05.2	21 23	-01.2
42007	30.1N	088.9W	738	31	21.4	28 17	05.9	01 11	14.9	739	31	19.3	27 20	11.3	03 13	15.4	739	31	03.6	05 18	-08.0	20 22	-00.6
42008	28.7N	095.3W	734	31	22.5	28 06	07.4	06 09	16.2														
42009	29.3N	087.5W	555	24	21.9	27 16	11.2	21 02	17.3	554	24	20.6	17 21	15.9	12 13	17.9	556	24	04.4	27 16	-07.2	21 02	-00.6
42011	29.6N	093.5W	735	31	20.4	28 10	07.2	06 10	15.4														
44003	40.8N	068.5W	138	09	09.5	06 11	00.0	02 12	02.6	212	09	04.9	01 01	04.5	04 23	04.7	212	09	04.8	06 11	-04.8	01 07	-03.0
44004	38.5N	070.7W	719	31	20.7	22 01	00.0	12 11	07.7	737	31	23.1	21 09	13.2	10 20	16.3	739	31	02.6	29 14	-16.1	01 17	-08.8
44005	42.7N	068.3W	482	26	07.8	22 07	00.0	03 04	03.6	742	31	05.6	25 19	04.8	11 10	05.1	742	31	02.7	14 17	-05.4	05 16	-02.7
44007	43.5N	070.1W	343	19	06.8	31 20	00.0	06 13	02.3	137	07	03.5	01 14	02.0	05 09	02.8	606	26	04.6	31 20	-02.4	06 13	-00.6
44008	40.5N	069.4W	568	30	10.7	14 14	00.0	01 05	03.9	730	31	06.2	22 19	04.0	15 19	05.0	732	31	05.5	14 14	-05.5	01 11	-01.9
44009	38.5N	074.6W	630	30	10.5	21 18	00.0	01 01	04.6	704	31	05.9	16 22	03.9	04 11	04.6	733	31	05.8	21 18	-04.8	12 20	-00.5
44010	36.9N	075.7W	571	27	12.6	22 21	00.0	10 00	06.5	610	27	08.8	25 23	05.3	10 12	06.2	738	31	06.0	21 19	-06.0	10 20	-00.3
45007	42.7N	087.1W	247	11	03.4	28 03	00.0	26 15	01.7	247	11	02.2	26 19	01.7	21 17	01.9	247	11	01.6	28 03	-02.0	26 15	-00.2
46001	56.3N	148.3W	728	31	06.4	04 00	01.2	02 11	04.2														
46002	42.5N	130.3W	738	31	12.1	08 23	07.7	16 21	10.3	738	31	11.6	03 02	10.3	15 17	10.8	738	31	01.2	11 13	-03.1	02 16	-00.4
46003	51.9N	155.7W	238	31	05.0	23 00	00.4	01 21	03.6	245	31	04.4	28 03	03.6	02 15	03.9	238	31	01.1	05 18	-03.3	01 21	-00.3
46004	51.0N	136.0W	736	31	08.4	09 19	03.5	02 07	07.1	736	31	07.6	19 23	07.3	01 00	07.4	737	31	01.0	09 19	-03.8	02 07	-00.3
46005	46.1N	131.0W	738	31	10.2	20 07	05.6	02 06	08.6	739	31	10.1	07 00	09.0	04 07	09.4	739	31	00.7	11 14	-03.7	02 06	-00.8
46006	40.7N	137.7W	714	31	12.8	03 21	08.4	31 08	10.8	739	31	12.2	29 00	11.3	14 08	11.7	739	31	01.1	11 03	-03.2	31 08	-00.9
46010	46.2N	124.2W	390	17	13.7	06 22	04.4	03 17	09.4	391	17	11.0	16 02	06.8	04 13	09.8	392	17	04.1	06 22	-04.7	03 16	-00.4
46011	34.9N	120.9W	736	31	15.8	04 13	09.8	31 13	12.7	736	31	14.4	06 19	11.9	30 15	13.1	736	31	03.0	04 13	-03.3	13 13	-00.4
46012	37.4N	122.7W	458	20	14.4	14 01	09.5	31 07	12.6	458	20	13.7	13 01	11.1	30 09	12.4	459	20	01.6	14 04	-01.9	17 03	00.2
46013	38.2N	123.3W	738	31	15.0	05 13	08.8	31 07	11.8	738	31	12.6	10 01	09.3	29 13	11.6	738	31	03.4	05 13	-02.0	08 14	00.2
46014	39.2N	124.0W	739	31	14.7	04 20	07.4	31 19	11.3	739	31	13.2	05 00	09.8	30 06	11.7	739	31	02.7	04 20	-02.8	17 13	-00.4
46016	63.3N	170.3W	004	02	00.7	10 00	00.1	08 00	00.6														
46017	60.3N	172.3W	008	02	01.0	07 03	00.1	07 00	00.5														
46022	40.8N	124.5W	737	31	16.3	05 20	07.4	31 12	11.0	737	31	12.7	19 22	10.7	03 13	11.3	737	31	04.7	05 20	-03.5	31 12	-00.3
46023	34.3N	120.7W	737	31	15.7	19 23	10.6	31 14	13.2	737	31	14.6	04 21	12.2	23 12	13.5	737	31	02.4	23 14	-02.9	31 14	-00.2
46025	33.6N	119.0W	260	11	18.4	24 00	12.9	31 13	15.5														
46026	37.8N	122.7W	734	31	20.0	04 18	08.4	31 08	11.8	734	31	14.0	19 20	09.4	30 15	12.1	735	31	07.7	04 18	-03.1	31 08	-00.3
46027	41.8N	124.4W	444	20	15.9	05 22	07.1	02 14	10.8	466	20	12.5	05 23	10.1	02 14	10.9	470	20	04.6	05 05	-05.0	02 14	-00.1
46028	35.8N	121.7W	735	31	14.7	19 21	09.1	31 11	12.4	737	31	14.1	07 23	11.0	29 20	12.6	737	31	01.6	05 16	-02.0	31 11	-00.3
46029	46.2N	124.2W	097	05	13.2	30 22	06.8	30 13	09.0	097	05	10.5	29 23	09.0	28 06	09.8	097	05	02.7	30 22	-03.1	30 13	-00.8
51001	23.4N	162.3W	737	31	25.0	18 04	20.4	04 19	23.2	737	31	25.2	19 01	22.9	02 11	23.8	738	31	00.5	01 19	-02.9	19 16	-00.6
BURL1	28.9N	089.4W	738	31	20.1	18 21	06.7	01 12	15.1														
CSBF1	29.7N	085.4W	726	31	21.7	23 20	05.1	01 08	15.3														
DBLN6	42.6N	079.5W	209	17	13.4	16 13	00.0	13 20	03.1														
DISW3	47.1N	090.7W	114	12	05.4	14 21	00.0	15 07	01.1														
GLLN6	43.5N	076.3W	235	17	06.2	21 21	00.0	06 12	01.6														
PTAT2	29.1N	095.4W	554	24	24.8	28 07	12.3	29 13	18.1														
ROAM4	47.9N	089.3W	102	14	02.3	26 21	00.0	15 07	00.5														
SBIO1	41.7N	082.8W	276	18	09.0	20 23	00.0	05 07	01.6														
SGNW3	43.8N	087.7W	258	17	03.5	30 20	00.0	04 23	00.8														
SISW1	48.3N	122.9W	733	31	12.3	09 23	04.5	03 15	08.2														
SRST2	29.7N	094.1W	738	31	21.8	24 22	05.0	20 12	15.1														
WPOW1	47.7N	122.4W	737	31	14.0	10 00	04.1	03 12	08.5														

MARCH 1984			PRESSURE (MB)							WIND SPEEDS (KNOTS)				MEAN WIND SPEED (KNOTS)								
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	MAX	DY HR	DIR	N	NE	E	SE	S	SW	W	NW	TOTAL
41001	34.9N	072.9W	737	31	1034.0	13 01	982.0	29 13	1015.5	735	39	09 08	240	16.3	14.6	15.7	19.1	21.4	23.6	22.3	21.6	19.7
41002	32.3N	075.3W	593	31	1029.3	12 16	985.8	29 08	1018.3	590	31	29 20	280	11.6	7.5	9.0	12.3	17.2	17.4	15.3	14.5	13.9
41006	29.3N	077.3W	731	31	1027.8	15 16	995.9	29 14	1017.3	736	35	29 13	270	8.3	10.2	11.9	13.7	15.8	16.8	15.8	12.6	13.3
42001	25.9N	089.7W	317	14	1024.8	01 03	1006.9	06 08	1017.6	497	32	29 03	320	16.4	10.7	13.2	13.1	12.3	9.9	8.1	22.2	13.4
42002	26.0N	093.5W	671	31	1029.1	08 16	995.7	28 09	1016.7	671	27	06 14	320	11.9	9.3	9.6	11.1	9.0	5.9	3.0	17.8	11.2
42003	26.0N	085.9W	239	11	1019.6	31 16	998.5	28 19	1011.7	238	36	29 09	310	8.9	9.7	13.5	12.2	20.4	18.9	26.4	22.9	16.7
42007	30.1N	088.9W	734	31	1027.2	09 16	993.6	28 09	1016.4	527	30	28 21	270	10.2	8.3	9.7	9.5	9.2	11.5	14.5	17.7	10.8
42008	28.7N	095.3W	734	31	1028.1	07 16	992.7	27 22	1016.0	735	33	28 17	310	17.2	10.2	11.3	11.3	10.6	7.7	8.5	18.9	12.5
42009	29.3N	087.5W	543	24	1028.3	08 16	994.9	28 14	1016.2	544	34	29 03	290	9.7	7.7	9.2	10.7	8.3	11.0	14.5	17.3	11.2
42011	29.6N	093.5W	736	31	1027.2	08 17	992.6	27 23	1015.8	733	36	28 13	310	18.2	11.5	8.9	12.8	11.2	11.5	11.3	23.9	13.4
44003	40.8N	068.5W	212	09	1026.7	05 14	995.7	01 00	1012.6	211	33	09 18	040	11.0	24.5	21.4	16.8	16.4	12.2	18.1	12.9	15.6
44004	38.5N	070.7W	733	31	1038.5	13 04	973.1	30 02	1012.9	731	37	09 18	320	15.0	10.7	17.1	15.2	19.9	18.4	18.1	16.0	16.5
44005	42.7N	068.3W	742	31	1043.3	13 17	979.6	30 07	1012.4	741	34	29 20	050	15.5	18.3	16.0	18.0	15.8	14.2	17.0	12.9	15.9
44007	43.5N	070.1W	720	31	1044.9	13 15	988.4	30 04	1014.3	710	31	12 00	270	13.4	13.8	12.8	7.1	10.0	12.8	14.0	9.6	12.4
44008	40.5N	069.4W	730	31	1040.5	13 09	972.5	29 19	1012.3	728	38	29 11	090	15.0	12.8	16.0	14.1	13.3	12.1	16.7	13.6	14.7
44009	38.5N	074.6W	696	31	1037.6	12 16	972.9	29 08	1015.9	701	41	29 20	300	13.4	15.1	14.3	11.4	13.3	12.3	14.3	17.5	14.8
44010	36.9N	075.7W	682	30	1036.2	12 16	977.3	29 05	1015.1	694	30	29 18	280	11.9	10.0	9.4	10.6	11.8	10.5	14.8	16.5	12.5
45007	42.7N	087.1W	247	11	1024.5	23 18	989.0	22 01	1012.2	247	24	22 14	310	13.8	11.1	9.9	5.9	7.3		14.2	14.0	12.3
46001	56.3N	148.3W	728	31	1013.8	04 21	980.8	01 14	1000.1	727	25	03 20	090	10.3	10.7	13.6	12.0	11.3	10.2	11.1	6.5	11.6
46002	42.5N	130.3W	738	31	1030.1	29 06	990.0	13 15	1017.0	735	33	15 13	260	5.6	9.0	6.7	14.0	12.9	12.5	15.4	14.5	13.1
46003	51.9N	155.7W	245	31	1013.4	30 18	971.2	04 00	996.4	243	30	03 18	040	8.5	15.8	17.0	14.5	11.6	14.6	13.9	15.3	14.1
46004	51.0N	136.0W	736	31	1025.9	04 18	983.9	27 22	1007.6	692	38	28 02	270	14.1	10.7	14.6	16.1	17.3	16.7	16.5	12.7	15.9
46005	46.1N	131.0W	739	31	1030.7	03 19	990.6	13 15	1014.0													
46006	40.7N	137.7W	739	31	1034.1	28 18	986.5	13 04	1016.7	739	36	07 13	150	14.5			22.1	18.7	18.4	18.6	19.1	19.1
46010	46.2N	124.2W	392	17	1031.8	03 20	996.8	13 17	1016.4	390	31	17 03	210	10.1	6.2	11.0	9.7	12.4	14.4	11.2	6.3	11.6
46011	34.9N	120.9W	736	31	1026.4	18 09	1010.1	30 00	1017.8	733	31	27 04	310	10.6	4.4	2.4	9.3	8.9	4.5	8.4	16.6	14.3
46012	37.4N	122.7W	458	20	1028.5	18 06	1010.3	13 23	1018.3	456	36	29 09	330	19.3	15.0		12.7	16.3	11.6	9.8	19.2	17.9
46013	38.2N	123.3W	738	31	1030.1	17 19	1008.7	13 16	1020.3	714	30	29 01	300	3.9	3.6	5.0	8.2	8.6	7.1	11.3	17.5	13.6
46014	39.2N	124.0W	739	31	1030.1	18 18	1003.6	13 15	1019.3	722	28	13 14	140	7.2	3.5	5.0	10.6	8.9	6.8	7.4	14.6	11.2
46016	63.3N	170.3W	246	31	1022.4	05 06	994.2	10 03	1009.1	246	41	05 15	070	11.8	26.2	26.0	19.1	15.4	10.7	7.3	11.7	24.6
46017	60.3N	172.3W	191	28	1016.8	05 03	989.2	10 00	1004.4	186	27	22 03	030	12.2	15.7	12.6	17.5		7.3	4.6	2.0	14.4
46022	40.8N	124.5W	737	31	1030.2	18 05	999.4	13 13	1019.8	727	37	16 19	170	14.0	5.0	3.9	7.1	15.0	11.8	10.1	13.7	12.5
46023	34.3N	120.7W	737	31	1024.5	18 07	1009.4	30 01	1017.4	734	38	27 08	330	16.6	6.5	11.4	14.3	9.3	5.6	7.3	21.3	19.9
46025	33.6N	119.0W	260	11	1017.5	23 19	1005.2	30 01	1012.4	246	29	30 02	300	4.5	3.6	3.7	4.3	3.4	3.9	9.2	8.3	07.4
46026	37.8N	122.7W	734	31	1029.2	18 16	1010.7	13 16	1019.7	718	28	13 16	160	5.7	7.3	6.8	8.4	11.4	7.5	9.3	14.7	12.2
46027	41.8N	124.4W	468	20	1030.2	18 04	999.1	13 13	1019.5	467	35	16 20	160	14.0	5.6	3.9	10.9	13.6	11.8	5.7	7.8	11.0
46028	35.8N	121.7W	737	31	1028.1	18 08	1013.7	29 23	1019.3	730	30	21 14	320	5.9	3.3	4.8	9.3	8.1	5.4	7.3	16.8	14.5
46029	46.2N	124.2W	097	05	1028.2	29 18	1011.0	31 01	1020.0	097	16	31 23	340	8.5	6.8	9.6		10.2	7.4	6.9	6.8	08.1
51001	23.4N	162.3W	738	31	1025.1	27 20	1006.2	04 01	1018.7	734	22	27 07	040	9.3	12.5	10.5	8.0	6.8	9.5	9.1	12.9	10.0
BURL1	28.9N	089.4W	732	31	1027.6	08 16	994.8	28 10	1016.0	738	39	28 22	250	8.5	9.9	12.4	11.6	12.9	11.7	18.9	17.0	12.5
CSBF1	29.7N	085.4W	722	31	1028.2	08 15	995.1	28 17	1017.8	732	31	29 00	250	3.2	3.0	5.4	5.3	6.9	7.8	11.8	5.8	06.8
DBLN6	42.6N	079.5W	727	31	1038.1	12 14	989.8	21 15	1017.2	729	41	16 15	230	10.2	12.9	7.7	8.4	6.4	15.7	15.1	9.0	12.1
DISW3	47.1N	090.7W	741	31	1045.0	16 21	1001.0	21 22	1021.1	739	38	10 23	280	12.8	12.3	7.8	5.1	5.0	10.6	11.1	12.8	10.5
GLLN6	43.5N	076.3W	739	31	1039.9	12 16	993.0	21 22	1016.9	738	42	11 23	280	8.0	9.9	7.2	14.1	13.7	16.4	15.8	13.1	11.9
PTAT2	29.1N	095.4W	554	24	1025.1	09 16	990.8	27 23	1014.3	554	24	28 10	310	11.4	9.4	10.6	11.3	10.2	8.6	21.3	14.7	11.2
ROAM4	47.9N	089.3W	741	31	1046.4	16 22	1001.2	10 19	1021.8	737	43	10 19	260	19.8	16.3	10.6	11.4	11.7	8.1	14.5	11.3	14.2
SBIO1	41.7N	082.8W	742	31	1035.8	17 04	991.8	22 06	1018.1	738	34	16 11	300	7.8	9.8	9.3	8.9	10.3	14.0	12.8	12.5	10.8
SGNW3	43.8N	087.7W	737	31	1038.5	17 01	989.2	22 01	1019.0	734	28	11 07	320	12.3	10.1	8.4	11.0	10.8	8.0	9.6	10.6	10.6
SISW1	48.3N	122.9W	732	31	1033.5	04 17	998.4	14 00	1017.1	732	38	17 05	160	3.9	3.1	6.0	13.2	8.4	4.0	6.4	4.3	07.5
SRST2	29.7N	094.1W	738	31	1026.6	07 16	991.0	27 22	1014.9	738	25	28 15	310	11.4	5.1	8.6	11.8	10.9	11.6	7.1	11.3	10.9
WPOW1	47.7N	122.4W	738	31	1032.5	04 17	997.8	14 00	1017.2	735	29	17 09	190	6.5	5.0	2.2	5.2	11.3	6.2	2.2	2.1	08.1

MARCH 1984			WAVE HEIGHTS (METERS)				FREQUENCY OF WAVE HEIGHTS (%)							
BUOY	LAT	LONG	OBS	MAX	DY HR	MEAN	<1M	1-1.5M	2-2.5M	3-3.5M	4-5.5M	6-7.5M	8-9.5M	>9.5M
41001	34.9N	072.9W	738	9.5	30 05	2.9	1.4	18.4	31.7	24.9	19.1	2.8	1.4	
41002	32.3N	075.3W	572	9.0	29 14	2.3	0.6	30.5	41.4	18.7	6.9	0.6	0.8	
41006	29.3N	077.3W	740	7.5	29 18	1.9	3.7	46.2	35.2	7.9	5.2	1.4		
42001	25.9N	089.7W	480	6.0	29 06	1.3	16.8	67.0	12.7	2.2	0.8	0.2		
42002	26.0N	093.5W	670	5.0	29 00	1.3	17.4	62.6	14.1	4.4	1.1			
42003	26.0N	085.9W	238	5.0	29 10	1.7	12.1	55.4	9.6	12.6	10.0			
42007	30.1N	088.9W	554	2.0	28 21	0.6	72.2	26.7	1.0					
44003	40.8N	068.5W	206	6.5	01 00	2.6	1.9	15.0	42.7	22.3	16.5	1.4		
44004	38.5N	070.7W	722	8.5	30 09	3.0	2.0	17.1	24.3	26.1	24.9	4.8	0.4	
44005	42.7N	068.3W	741	10.0	29 23	3.0	2.1	23.6	28.2	15.9	23.4	3.9	1.8	0.8
44007	43.5N	070.1W	640	6.0	14 16	1.6	29.2	33.5	24.0	7.8	5.1	0.1		
44008	40.5N	069.4W	675	8.0	29 19	2.7	4.2	21.3	33.4	21.4	15.1	4.1	0.1	
44010	36.9N	075.7W	719	8.5	09 14	1.0	37.9	52.2	9.7					
45007	42.7N	087.1W	239	3.5	22 13	1.4	29.2	38.9	20.5	11.2				
46001	56.3N	148.3W	715	7.5	04 13	3.0		10.0	34.1	37.4	15.5	2.7		
46002	42.5N	130.3W	638	9.0	15 14	3.6		4.0	17.0	38.8	34.3	4.8	0.7	
46003	51.9N	155.7W	245	7.5	04 09	3.5		0.8	22.8	41.2	30.6	4.4		
46004	51.0N	136.0W	731	9.5	01 12	3.9		4.6	14.3	35.1	35.7	6.9	3.1	
46005	46.1N	131.0W	735	7.5	19 02	3.4		8.1	16.8	37.0	34.5	3.4		
46006	40.7N	137.7W	737	8.5	08 13	3.7			18.9	36.7	37.9	5.9	0.2	
46010	46.2N	124.2W	373	7.0	17 05	2.4	7.7	21.9	23.3	36.4	8.8	1.6		
46011	34.9N	120.9W	684	4.5	09 22	2.4	2.1	18.8	41.3	31.2	6.2			
46012	37.4N	122.7W	457	5.5	14 13	2.8		5.0	40.2	46.3	8.3			
46013	38.2N	123.3W	737	6.0	14 11	2.8	2.0	14.3	21.7	45.3	16.2	0.2		
46014	39.2N	124.0W	737	6.0	16 06	2.7	2.3	15.8	30.5	38.2	12.8	0.1		
46022	40.8N	124.5W	737	6.0	16 02	2.9	0.2	14.5	29.8	35.5	19.2	0.5		
46023	34.3N	120.7W	734	5.5	30 04	2.8	2.0	11.7	28.7	36.7	20.7			
46025	33.6N	119.0W	260	4.0	30 03	1.6		68.4	27.3	3.8	0.3			
46026	37.8N	122.7W	725	4.5	14 11	2.1	4.5	24.9	51.3	17.6	1.5			
46028	35.8N	121.7W	732	5.5	14 16	2.8	0.6	15.1	27.8	36.2	20.0			
46029	46.2N	124.2W	097	4.5	29 08	2.2		32.9	37.1	19.5	10.3			
51001	23.4N	162.3W	735	7.5	05 11	2.7		6.1	54.6	29.1	8.2	1.7		

MARCH 1984			TOTAL FREQUENCY OF WIND SPEEDS (%)							TOTAL FREQUENCY OF WIND DIRECTIONS (%)							
BUOY	LAT	LONG	CALM	<4KT	4-10KT	11-21KT	22-33KT	34-47KT	>47KT	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W		1.4	12.9	44.6	38.0	3.1		20.9	4.5	2.0	6.1	13.6	0.7	10.3	21.1
41002	32.3N	075.3W		1.9	25.4	61.2	11.5			26.1	2.5	4.5	6.9	11.8	9.8	20.6	18.6
41006	29.3N	077.3W		6.9	28.8	52.7	11.3	0.3		11.0	10.6	7.5	10.6	12.4	10.9	16.4	20.4
42001	25.9N	089.7W		2.8	35.4	54.5	7.2			11.5	14.9	39.2	16.3	8.7	1.9	0.8	4.7
42002	26.0N	093.5W		3.4	44.1	49.0	3.4			9.1	7.2	25.7	42.6	4.7	0.7	0.3	9.8
42003	26.0N	085.9W		3.8	22.3	45.0	26.9	2.1		10.8	6.4	15.9	13.8	26.9	8.8	4.4	13.0
42007	30.1N	088.9W		9.1	41.2	44.4	5.3			3.7	7.4	19.9	31.1	10.4	9.5	7.4	10.5
42008	28.7N	095.3W		2.0	33.3	57.4	7.2			8.2	5.2	24.3	30.9	14.9	2.5	1.3	12.8
42009	29.3N	087.5W		7.9	45.8	38.2	7.9	0.2		5.1	9.5	17.6	26.5	9.1	5.4	16.8	10.2
42011	29.6N	093.5W	0.8	1.9	31.7	55.5	10.2	0.7		9.9	4.0	6.4	36.2	20.9	11.2	3.2	8.1
44003	40.8N	068.5W		4.7	13.7	65.4	16.1			9.7	3.7	3.4	2.0	9.1	3.4	35.4	33.2
44004	38.5N	070.7W		1.2	16.0	64.3	18.3	0.1		17.0	4.7	7.4	3.7	4.9	6.0	24.6	31.7
44005	42.7N	068.3W		2.3	24.6	49.9	23.1	0.1		18.7	19.9	7.0	4.4	4.2	7.4	18.5	20.0
44007	43.5N	070.1W		5.1	34.4	53.7	6.9			30.6	11.4	6.8	2.5	5.7	7.8	17.7	17.5
44008	40.5N	069.4W		3.4	21.0	62.9	11.7	1.0		23.7	10.3	13.0	3.4	4.9	5.1	20.0	19.5
44009	38.5N	074.6W	1.6	2.3	29.8	50.4	16.0	1.6		15.5	9.9	0.7	6.7	8.2	9.7	8.9	32.5
44010	36.9N	075.7W	*	8.5	30.8	51.3	9.4			20.4	9.7	9.6	10.8	6.9	7.4	10.9	22.0
45007	42.7N	087.1W		2.4	39.3	53.8	4.5			25.0	10.3	15.7	4.8	2.3		6.1	27.8
46001	56.3N	148.3W		4.0	37.8	54.3	3.9			5.8	5.7	22.9	25.2	14.6	10.9	11.7	3.4
46002	42.5N	130.3W		4.2	31.6	57.0	7.2			1.0	5.3	6.4	6.8	22.6	18.7	25.9	13.3
46003	51.9N	155.7W		2.5	26.3	61.7	9.5			3.8	7.6	7.8	16.0	15.7	20.1	19.9	9.1
46004	51.0N	136.0W		1.0	15.5	67.3	15.6	0.6		2.9	6.0	8.7	22.5	24.0	16.0	16.3	3.6
46006	40.7N	137.7W		0.7	11.0	54.5	32.2	1.6		0.5			13.1	23.3	23.0	27.7	12.4
46010	46.2N	124.2W		6.4	33.3	54.4	5.9			7.2	4.8	18.8	9.6	29.0	24.1	3.4	3.1
46011	34.9N	120.9W		5.7	23.6	56.2	14.5			12.1	2.0	1.8	2.7	2.7	1.1	5.5	72.1
46012	37.4N	122.7W		1.8	12.1	56.8	28.7	0.7		24.8	0.1		2.8	10.4	4.6	5.2	52.1
46013	38.2N	123.3W		10.8	25.4	45.5	18.3			1.2	1.1	4.0	9.1	7.1	4.8	17.8	55.0
46014	39.2N	124.0W		10.5	42.9	39.1	7.5			9.7	1.8	5.7	17.3	8.6	3.6	6.2	47.1
46016	63.3N	170.3W		0.8	6.9	20.3	60.2	11.8		1.5	42.7	45.7	1.9	2.7	1.2	1.2	2.9
46017	60.3N	172.3W		3.2	24.7	59.1	12.9			14.4	64.1	11.0	4.6		4.0	1.3	0.5
46022	40.8N	124.5W		8.3	33.7	47.6	10.2	0.3		32.6	3.2	2.7	9.1	25.1	13.5	6.1	7.7
46023	34.3N	120.7W		1.8	14.0	33.4	49.2	1.6		8.8	0.3	0.9	2.2	1.3	0.8	2.9	82.8
46025	33.6N	119.0W		23.6	56.1	18.3	2.0			1.0	4.5	4.0	5.3	3.2	7.7	44.8	25.5
46026	37.8N	122.7W		8.9	30.8	53.5	6.8			1.8	1.7	4.0	3.0	10.7	7.7	14.4	56.8
46027	41.8N	124.4W	3.6	10.5	45.2	36.0	8.1	0.2		10.4	4.5	7.7	25.3	33.6	9.3	4.6	4.6
46028	35.8N	121.7W		7.0	25.2	48.5	19.3			1.6	0.4	1.9	3.6	2.0	3.3	10.5	76.7
46029	46.2N	124.2W		11.3	63.9	24.7				31.2	10.6	16.0		4.1	16.5	9.5	12.1
51001	23.4N	162.3W		6.7	50.1	43.1	0.1			2.5	14.7	29.6	19.7	5.0	11.0	11.1	6.5
BURL1	28.9N	089.4W	2.2	6.1	35.5	49.3	8.0	1.1		6.8	19.1	28.5	9.5	8.6	10.7	9.0	7.9
CSBF1	29.7N	085.4W	8.2	31.7	50.3	14.6	3.4			7.2	8.1	18.2	13.2	15.5	7.4	19.8	10.6
DPLN6	42.6N	079.5W	1.8	10.3	37.3	39.8	11.8	0.8		6.2	29.1	5.4	8.4	9.3	20.9	14.3	6.4
DISW3	47.1N	090.7W	3.7	12.9	41.9	38.4	6.4	0.4		20.0	26.0	11.4	0.5	8.1	8.9	6.9	10.8
GLLN6	43.5N	076.3W	1.2	8.1	41.7	39.3	9.5	1.4		12.7	30.8	6.0	6.5	6.2	5.9	18.8	13.1
PTAT2	29.1N	095.4W	0.2	2.2	43.1	53.8	0.9			7.4	11.9	28.1	37.2	5.5	0.6	0.4	8.8
ROAM4	47.9N	089.3W	2.6	6.4	30.8	45.2	15.2	2.4		14.0	37.0	18.6	5.2	4.4	7.2	8.2	5.4
SBIO1	41.7N	082.8W	1.4	8.9	44.3	40.9	5.7	0.1		13.2	21.8	15.1	4.3	3.6	12.1	16.7	13.2
SGNW3	43.8N	087.7W	1.1	7.8	47.8	41.6	2.9			23.9	15.4	10.7	8.6	9.5	4.9	7.1	20.0
STSW1	48.3N	122.9W	10.4	30.5	45.2	18.6	5.1	0.7		6.6	9.2	9.2	26.4	9.8	7.7	19.0	11.6
SRST2	29.7N	094.1W	0.4	4.5	44.9	49.6	1.1			8.6	4.0	7.5	39.3	22.2	3.6	2.8	12.1
WPOW1	47.7N	122.4W	6.9	22.9	48.6	25.3	3.3			17.9	16.2	2.8	11.2	45.5	4.6	0.6	1.3

MARCH 1984			% FREQUENCY OF WIND SPEEDS (<4 KTS)								% FREQUENCY OF WIND SPEEDS (4-10 KTS)								% FREQUENCY OF WIND SPEEDS (11-21 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W	0.3	0.1	0.1	0.2	0.2	0.2	0.1	0.1	5.7	0.9	0.7	1.5	1.1	0.5	0.5	2.0	16.3	3.2	1.4	1.2	5.0	2.2	6.5	8.7
41002	32.3N	075.3W	0.8			0.2		0.2	0.1	0.6	10.1	2.0	3.1	1.7	1.3	0.7	3.1	3.5	15.3	0.5	1.5	5.0	7.5	5.3	14.0	12.1
41006	29.3N	077.3W	1.7	0.5	0.8	1.2	0.5	0.7	0.2	1.3	5.7	4.7	1.8	1.6	2.8	1.8	4.4	6.0	3.6	5.6	4.9	7.8	5.7	4.8	8.3	12.1
42001	25.9N	089.7W	0.5	0.4	0.2	0.7	0.5	0.5	0.2		2.5	9.2	13.0	6.0	3.5	0.3	0.4	0.6	5.7	5.0	25.9	11.4	4.0	1.2	0.2	1.2
42002	26.0N	093.5W	0.3	0.1	0.9	1.2	0.3	<.05	0.3	0.3	3.3	4.6	14.6	17.1	2.6	0.7		1.3	5.5	2.5	10.2	24.3	7.8	<.05		4.7
42003	26.0N	085.9W	0.7	0.1		0.5	0.3			2.1	6.7	4.7	3.6	4.1	1.9	1.3			3.4	1.2	11.9	8.3	12.3	4.2	1.1	2.7
42007	30.1N	088.9W	0.4	1.4	1.9	2.0	1.9	0.3	0.7	0.4	1.3	3.0	8.6	18.2	4.3	3.5	1.7	0.7	1.9	3.2	9.3	10.5	4.0	5.5	3.5	6.4
42008	28.7N	095.3W	0.5	0.3	0.3	<.05	0.2	0.2	0.2	0.2	0.7	2.1	8.3	11.5	7.1	1.8	0.6	1.3	4.4	2.8	15.6	19.2	7.6	0.5	0.5	6.9
42009	29.3N	087.5W	1.0	1.3	0.9	0.8	2.1	0.7	0.5	0.6	1.9	6.3	10.2	13.3	4.5	1.5	5.5	2.6	2.1	1.9	6.5	11.8	2.0	2.9	8.0	3.1
42011	29.6N	093.5W		<.05	0.9	0.6	0.1	0.3			1.6	2.1	3.0	11.3	8.0	3.6	1.4	0.5	4.8	1.5	2.6	23.1	12.7	7.3	1.7	1.9
44003	40.8N	068.5W	2.1	0.6	0.4	0.1		0.7	0.7	0.1	0.4		0.5		1.4	0.9	1.8	8.8	6.9	0.1	0.4	1.7	6.4	1.7	24.6	23.7
44004	38.5N	070.7W	0.1	0.3	0.1	0.2		0.1		0.4	2.7	2.3	1.5	0.8	0.2	0.8	2.7	5.1	13.4	1.6	3.4	2.3	2.4	2.8	15.2	23.2
44005	42.7N	068.3W	0.1	0.2	0.2	0.4	0.2	0.1	0.6	0.5	5.7	5.2	2.4	0.8	0.4	1.7	1.8	6.4	8.4	5.7	2.2	1.3	2.6	5.1	13.1	11.7
44007	43.5N	070.1W	0.8	0.6	0.9	0.3	0.4	0.5	0.6	1.0	8.1	4.3	2.1	1.9	2.6	2.0	4.8	8.5	19.7	4.7	3.1	0.3	2.7	4.8	10.4	8.0
44008	40.5N	069.4W	0.9	1.2	0.7	<.05	0.3			0.3	4.9	3.0	2.6	0.8	1.6	2.1	1.6	4.4	14.5	4.7	6.1	2.6	3.0	2.6	15.5	14.0
44009	38.5N	074.6W	0.5	0.2	0.2	0.4		0.3	0.5	0.1	4.7	3.1	2.1	3.4	3.5	4.2	3.1	5.8	8.8	4.2	5.3	2.6	3.5	4.3	3.4	18.2
44010	36.9N	075.7W	1.4	1.3	1.4	1.0	0.8	1.0	1.0	0.6	7.3	4.0	4.3	4.3	2.5	2.1	2.2	4.0	11.1	4.3	4.0	5.2	5.4	4.2	5.7	11.4
45007	42.7N	087.1W	0.6	0.1	0.4	1.2				0.1	6.6	8.2	8.4	3.5	2.3		1.9	8.3	17.4	10.0	6.9				3.2	16.3
46001	56.3N	148.3W		0.1	0.1	0.4	0.9	0.7	0.9	0.9	3.6	2.4	4.6	9.7	6.4	5.3	3.7	2.2	1.9	3.2	16.7	14.0	6.4	5.0	6.8	0.4
46002	42.5N	130.3W	0.3	0.5	1.5	0.1	0.9	0.8	0.2		0.7	2.8	3.9	2.3	5.7	5.3	6.4	4.5		2.1	1.0	3.7	14.8	11.6	15.5	8.3
46003	51.9N	155.7W	0.6	0.6		0.6	0.6				2.3	1.3	2.0	3.7	7.0	4.8	3.7	1.5	0.9	3.6	4.0	10.3	7.0	13.5	15.5	6.9
46004	51.0N	136.0W	0.1	0.1			0.1	0.3	0.1	0.1	0.8	3.2	2.8	2.9	1.6	1.5	1.9	0.8	1.9	2.6	5.2	17.0	17.1	10.2	10.6	2.7
46006	40.7N	137.7W				0.1	0.3	0.1	0.1					0.5	3.0	3.0	3.5	0.9	0.5			4.4	11.9	14.3	15.8	7.5
46010	46.2N	124.2W	1.0	1.5	1.3	0.4	0.6	0.8	0.4	0.3	2.3	2.6	6.0	4.9	9.2	5.1	0.7	2.6	3.8	0.7	11.5	4.3	17.6	14.0	2.2	0.2
46011	34.9N	120.9W	0.9	0.3	1.6	0.6	0.6	0.5	0.6	0.5	5.3	1.7	0.3	0.9	1.0	0.5	3.2	10.8	5.8	<.05		1.1	1.2	<.05	1.5	46.5
46012	37.4N	122.7W	0.2			0.3	0.5	0.2	0.4	0.1	0.8			1.4	2.0	1.6	2.6	3.6	15.4	0.1		0.6	5.0	2.8	2.0	31.0
46013	38.2N	123.3W	0.4	0.6	1.3	2.0	1.8	1.0	2.5	1.2	0.8	0.6	2.7	4.0	3.0	2.3	5.4	6.6				3.1	1.9	1.5	9.1	29.9
46014	39.2N	124.0W	1.0	1.0	2.0	2.0	1.6	0.8	1.4	0.8	7.3	0.9	3.7	8.3	3.9	2.4	3.5	13.0	1.5			5.5	3.1	0.5	1.3	27.3
46016	63.3N	170.3W	0.3	0.4						0.1		1.3	2.2	0.1	0.4	0.8	1.2	0.8	1.2	5.2	7.3	1.8	2.3	0.4		2.0
46017	60.3N	172.3W	0.5		1.1			1.1		0.5	4.6	14.8	2.6	0.1		1.3	1.3		9.3	37.5	6.9	3.9		1.6		
46022	40.8N	124.5W	1.9	1.0	1.2	2.2	0.6	0.4	0.8	0.2	6.9	2.1	1.5	5.5	7.9	5.3	2.1	2.5	19.8	0.1		1.3	11.6	7.5	3.1	4.2
46023	34.3N	120.7W	0.3	<.05	0.1		0.2	<.05	0.3	0.7	2.2	0.3	0.4	0.5	0.3	0.7	2.3	7.3	3.8		0.1	1.4	0.7	<.05	0.3	27.7
46025	33.6N	119.0W	0.4	3.2	5.0	1.3	1.7	3.5	3.4	5.2	0.6	1.3	3.0	4.0	1.4	4.3	26.9	14.5							13.4	4.9
46026	37.8N	122.7W	0.5	0.5	1.4	0.8	1.1	1.6	1.4	1.6	1.1	0.8	1.5	1.4	4.0	4.6	7.1	10.4	0.2	0.5	1.1	0.6	4.5	1.5	5.9	39.1
46027	41.8N	124.4W		1.1	2.6	3.3	1.1	0.7	1.1	0.5	3.3	2.9	5.1	10.9	13.6	3.0	2.6	3.0	6.5	0.5		0.9	13.9	4.6	0.9	0.7
46028	35.8N	121.7W	0.3	0.2	0.2	0.1	0.4	0.9	2.3	2.5	1.2	0.2	1.7	2.3	1.1	2.2	5.9	10.7	0.1			1.7	0.4	0.2	2.4	44.2
46029	46.2N	124.2W	3.9	1.3	0.8			1.3	1.5	2.6	17.8	9.3	7.0		2.6	13.4	6.2	7.7	9.5		0.2		1.5	1.8	1.8	1.8
51001	23.4N	162.3W	0.4	0.7	1.5	1.5	0.9	0.8	0.8	0.1	1.2	4.4	12.4	13.1	3.2	6.4	7.3	2.2	0.9	9.5	15.8	5.0	0.9	3.8	3.0	4.1
BURL1	28.9N	089.4W	1.4	1.1	0.7	1.0	0.3	0.1	0.7	0.7	3.2	9.6	8.7	3.6	2.9	5.7	1.0	0.8	1.9	8.4	18.3	4.4	5.0	3.6	3.8	3.9
CSBF1	29.7N	085.4W	3.9	5.8	5.3	3.4	5.3	0.6	4.5	2.9	3.4	2.3	12.7	9.2	5.5	4.8	5.5	6.0			0.1	0.6	4.7	1.8	6.6	0.8
DPLN6	42.6N	079.5W	0.4	1.4	1.5	2.2	1.1	2.0	1.0	0.7	2.8	9.9	2.5	3.2	7.2	4.3	3.7	3.7	2.9	15.9	1.5	2.9	1.0	8.8	5.1	1.7
DISW3	47.1N	090.7W	1.1	0.8	2.8	2.0	2.3	0.9	1.7	1.3	6.7	9.1	5.2	6.5	5.6	3.7	2.7	2.5	10.1	14.7	3.0		0.2	3.2	1.3	5.8
GLLN6	43.5N	076.3W	2.8	1.1	0.8	0.2	0.7	0.6	1.1	0.8	5.9	16.7	4.0	2.1	1.4	1.1	5.4	5.2	3.8	13.0	1.1	3.6	3.0	2.2	7.5	5.2
PTAT2	29.1N	095.4W	0.2	0.9	0.3	0.5	0.3				3.0	6.0	12.6	16.0	3.2	0.5		1.8	4.3	5.0	15.2	20.8	1.9	0.1	0.3	6.3
ROAM4	47.9N	089.3W	0.6	1.5	1.2	0.7	0.3	1.5	0.4	0.3	1.8	7.6	9.1	1.5	1.7	4.3	2.5	2.1	5.8	18.8	7.5	3.0	2.1	0.9	4.2	2.8
SBIO1	41.7N	082.8W	1.6	2.0	1.2	0.5	0.2	0.8	1.3	1.3	8.7	10.9	8.0	2.2	1.4	3.5	5.0	4.6	2.9	8.6	6.0	1.6	2.0	5.7	8.8	5.5
SGNW3	43.8N	087.7W	0.8	0.5	2.0	1.3	1.0	1.1	0.4	0.7	8.6	9.3	5.3	3.9	4.1	2.6	3.8	10.6	13.7	5.4	3.4	3.0	4.0	0.9	2.8	8.2
SISW1	48.3N	122.9W	2.8	5.4	2.3	2.9	2.5	4.0	5.2	5.4	3.6	3.7	5.7	8.2	4.9	3.3	10.1	5.7	0.2	0.1	1.1	10.6	1.3	0.4	4.3	0.5
SRST2	29.7N	094.1W	0.7	1.1	0.8	0.9	0.4		0.4	0.2	3.2	2.8	4.5	14.4	10.1	1.7	2.0	6.1	4.7	0.1	2.1	23.9	11.6	1.7	0.4	5.0
WPOW1	47.7N	122.4W	2.8	5.5	2.3	3.8	5.1	1.7	0.6	1.0	11.7	9.6	0.5	6.8	10.0	1.7		0.3	3.4	1.1		0.5	19.3	1.2		

MARCH 1984			% FREQUENCY OF WIND SPEEDS (22- 33 KTS)								% FREQUENCY OF WIND SPEEDS (34-47 KTS)								% FREQUENCY OF WIND SPEEDS (>47 KTS)							
BUOY	LAT	LONG	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W	6.6	0.2	0.6	3.0	6.8	5.2	6.7	8.8				0.1	0.5	0.6	0.5	1.4								
41002	32.3N	075.3W				0.1	2.9	2.8	3.3	2.4																
41006	29.3N	077.3W				0.1	3.4	3.5	3.2	1.1							0.3									
42001	25.9N	089.7W	2.8	0.4	0.2	0.3	0.8			2.9																
42002	26.0N	093.5W								3.4																
42003	26.0N	085.9W		0.4	0.4	0.8	12.1	3.3	3.4	6.5					0.3	0.1		1.7								
42007	30.1N	088.9W				0.4	0.2	0.2	1.6	3.0																
42008	28.7N	095.3W	2.6			0.1				4.5																
42009	29.3N	087.5W				0.6	0.5	0.2	2.7	3.9							0.1	<.05								
42011	29.6N	093.5W	3.4	0.3		1.3	0.1		0.1	5.0								0.7								
44003	40.8N	068.5W	0.4	3.0	2.3	0.2	1.3	0.1	8.3	0.6																
44004	38.5N	070.7W	0.8	0.5	2.5	0.4	2.3	2.3	6.7	2.8								0.1								
44005	42.7N	068.3W	4.5	8.7	2.1	1.9	0.9	0.5	3.0	1.3		0.1														
44007	43.5N	070.1W	2.0	1.9	0.6			0.5	1.9																	
44008	40.5N	069.4W	3.1	1.5	3.1			0.4	3.0	0.7	0.4	<.05	0.5													
44009	38.5N	074.6W	1.4	2.2	0.9	0.3	1.2	0.9	1.8	7.2		0.2	0.1				0.1	1.2								
44010	36.9N	075.7W	0.8			0.3	0.1	0.2	2.0	5.9																
45007	42.7N	087.1W	0.4						0.9	3.1																
46001	56.3N	148.3W			1.5	1.1	1.0	<.05	0.3																	
46002	42.5N	130.3W				0.7	1.2	1.0	3.8	0.5																
46003	51.9N	155.7W		2.1	1.9	1.4	1.1	1.7	0.6	0.6																
46004	51.0N	136.0W			0.6	2.6	5.3	4.0	3.1								0.6									
46006	40.7N	137.7W				7.7	7.9	5.2	7.5	3.8				0.3	0.1	0.3	0.7	0.2								
46010	46.2N	124.2W					1.7	4.2																		
46011	34.9N	120.9W	0.1						0.1	14.2																
46012	37.4N	122.7W	0.3			0.4	2.9		0.2	16.9	0.2							0.5								
46013	38.2N	123.3W				0.1	0.4		0.7	17.2																
46014	39.2N	124.0W				1.5				6.0																
46016	63.3N	170.3W		30.9	29.3							4.9	6.9													
46017	60.3N	172.3W		11.8	0.5	0.5																				
46022	40.8N	124.5W	4.0			0.1	4.9	0.4	0.1	0.7					0.3											
46023	34.3N	120.7W	3.2		0.2	0.3				45.5								1.6								
46025	33.6N	119.0W							1.1	0.9																
46026	37.8N	122.7W				0.2	1.1			5.6																
46027	41.8N	124.4W	0.6			2.1	4.9	0.5						0.1	0.2											
46028	35.8N	121.7W								19.3																
46029	46.2N	124.2W																								
51001	23.4N	162.3W		0.1																						
BURL1	28.9N	089.4W	0.2	0.1	0.6	0.6	0.3	0.8	2.9	2.4						0.4	0.6									
CSBF1	29.7N	085.4W						0.2	3.1	0.1																
DPLN6	42.6N	079.5W		1.9		0.1		5.0	4.5	0.3						0.8										
DISW3	47.1N	090.7W	2.2	1.3	0.3			0.5	0.9	1.1							0.4	<.05								
GLLN6	43.5N	076.3W	0.1			0.7	1.1	2.0	3.8	1.8							1.1	0.2								
PTAT2	29.1N	095.4W							0.1	0.8																
ROAM4	47.9N	089.3W	5.0	8.5	0.8		0.2	0.1	0.5	0.1	0.8	0.7				0.3	0.6	<.05								
SBIO1	41.7N	082.8W		0.3				2.1	1.6	1.7								0.1								
SGNW3	43.8N	087.7W	0.8	0.1		0.8	0.4	0.3		0.4																
SISW1	48.3N	122.9W				4.2	0.7		0.1					0.5	0.2											
SRST2	29.7N	094.1W				0.2	0.1	0.1		0.7																
WPOW1	47.7N	122.4W					3.2	<.05																		

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Vessel	Nationality	Date	Position of Ship		Time GMT	Wind		Visibility	Present Weather code	Pressure mb.	Temperature °C.		Sea Waves*		Swell Waves		
			Lat. deg.	Long. deg.		Dir. 10°	Speed kt.	n. mi.			Air	Sea	Period sec.	Height ft.	Dir. 10°	Period sec.*	Height ft.
	PACIFIC	MAR.															
PRESIDENT MC KINLEY	WYFZ	01	35.0 N	148.4 E	00	27	M 45	2 NM	16	0995.0	7.2	15.6	10	16.5	30	12	19.5
TENSONIA	KJDS	01	14.5 N	95.5 W	05	01	M 65	5 NM		1010.0							
SEA LANTERN	SMSK	01	53.0 N	172.0 W	06	04	M 45	1 NM	54	0980.0	4.0	5.0	7	13	02	7	13
	ASPJ	01	54.0 N	172.4 W	06	04	M 54			0985.0	2.0	3.0	10	13	04	14	29.5
SEALAND FREEDOM	WJJW	02	47.2 N	159.6 E	00	08	M 55	5 NM	66	0987.0	3.5	2.0	5	13	08	7	16.5
SHATSINO SOUND	ELAW2	02	47.5 N	155.0 E	00	06	M 48	5 NM		0995.5	2.0		8	19.5			
SEALAND DEVELOPER	KHRH	02	36.0 N	147.4 E	06	32	M 48	2 NM	96	1009.2	5.5	12.0	9	21			
MARGARET JOHNSON	GXNS	02	32.3 N	154.9 E	00	30	M 56	5 NM	27	0995.8	9.2	14.3	10	16.5			
NEW INDEPENDENCE	SXDS	02	32.3 N	155.3 E	16	31	M 55	5 NM	27	1004.0	8.0	15.0	3	18	30	8	32.5
NEW INDEPENDENCE	SXDS	03	33.6 N	154.7 E	00	30	M 45	5 NM	27	1007.0	10.5	14.0	8	13	30	16	32.5
SEALAND DEVELOPER	KHRH	03	36.4 N	154.6 E	00	31	M 45	10 NM	25	1004.5	9.0	15.0	7	16.5	33	10	19.5
MARGARET JOHNSON	GXNS	03	32.2 N	160.4 E	00	30	M 47	10 NM	27	0995.0	8.8	14.0	8	13			
DIANA	DJDI	04	32.6 N	176.8 E	00	26	30	200 YD		1002.8			15	24.5	25	25	41
THOMPSON PASS	DDJV	05	42.8 N	172.1 W	04	20	M 46	10 NM	02	0998.0	7.0	8.0	5	14.5	27	10	24.5
	WJPY	05	54.4 N	138.6 W	17	26	40			0992.0	5.0	5.6	8	39	27	8	39
	ASPJ	05	46.4 N	153.6 E	16	28	M 54	50 YD	75	0992.5		2.0					
ARCTIC TOKYO	SLJT	06	48.3 N	154.4 E	00	27	M 52	5 NM	02	0999.0		7.0	12	16.5			
PRESIDENT TYLER	WEZM	06	39.4 N	144.4 E	00	28	45	10 NM	01	1013.1	1.1	0.0	7	16.5	23	8	19.5
E T ALASKA	WFOE	06	43.4 N	129.4 W	12	32	46	5 NM	02	1011.5	10.0	10.0					
	AGPJ	06	43.0 N	149.4 E	16	30	M 50			1005.0		2.0					
	AGPJ	07	43.4 N	149.0 E	00	29	M 47	5 NM	02	1009.0	- 0.5	2.0	10	19.5	24	10	19.5
	DJDI	07	34.2 N	159.7 W	00	34	17			1002.6			0	0	34	33	54
BONITA	ELAN2	07	44.3 N	173.7 W	00	28	M 48	5 NM	07	1001.0	6.0	9.0	7	10	27	9	13
	LDEF	07	34.9 N	178.7 E	14	21	M 48			1008.0	14.5		4	10	25	8	16.5
ARCO JUNEAU	KSPG	07	50.1 N	134.6 W	23	23	M 60	2 NM	81	0994.0	7.8	7.2	8	34.5	22	15	42.5
S.S. MORIL MERIDIAN	KUSM	08	54.4 N	132.6 W	00	18	45	5 NM	25	0996.2	9.1	7.8	3	8	18	10	19.5
E T ALASKA	D9HS	08	33.9 N	153.4 E	14	16	M 55	200 YD	67	0996.0	15.0	17.5	6	21	18	7	13
	WFOE	08	52.9 N	127.4 W	12	30	46	5 NM	00	1002.5	6.7	6.7					
TAIMO VENTURE	AHUE	09	35.8 N	161.6 E	00	22	M 55			0994.0	18.0	14.0	9	19.5	21	11	21
	LDEF	09	32.4 N	166.5 E	06	19	M 50	2 NM	63	1008.0	17.0	16.0	4	13			
MANUKANT	KNIU	09	23.5 N	154.6 W	14	08	M 19	10 NM		1022.2	22.2	24.4	3	3	08	10	41
GOLDEN DAISY	6ZSO	10	40.2 N	175.0 E	00	18	M 50	5 NM	64	1010.0	9.0	10.0	7	14.5	18	7	14.5
	DJDI	10	37.4 N	135.7 W	20	18	17			1002.6	4.3		0	0	18	18	29.5
SEA FAN	ELCQ3	10	49.6 N	171.7 E	05	27	M 53	200 YD	84	0980.0	2.5	6.0	10	32.5	27	8	29.5
VAL HAWK	DS7U	10	42.0 N	178.6 E	06	26	M 63	.5 NM	17	1000.0	7.3	2.0	5	18	26	14	39
	WGJF	10	49.9 N	147.7 W	19	29	M 47	10 NM		1012.5	5.0	5.0	9	24.5	29	9	24.5
	WGJF	11	49.5 N	146.2 W	00	27	M 22	10 NM		1019.0	10.0	5.0	6	19.5	27	12	29.5
PRESIDENT WASHINGTON	WHPN	11	50.0 N	167.7 E	04	02	45	10 NM	00	1002.2	- 1.1	2.8	5	10	02	11	16.5

+ Direction for sea waves same as wind direction
X Direction or period of waves indeterminate
M Measured wind

NOTE: The observations are selected from those with winds ≥ 40 kn or waves ≥ 20 ft from April through September and 45 kn or 30 ft October through March.